TUBERCULOSIS, A SCIENTIFIC PROBLEM.

XIV.

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Introduction.

It has been interesting to note in studying this particular disease of mankind the rapid progress made in developing methods of its control.

In reviewing the work of those men who worked untireingly to discover the cause of tuberculosis and some method of control we pause and pay tribute to them.

Most of the science we learn today represents the accumulation of discoveries painstakingly explored by pioneers. These pioneers left theories and facts that enabled the present day explorer in science to reach new facts and conclusions that are valuable.

By retraveling some of the trails with these pioneers in the field and obtaining a historical viewpoint we will be able to appreciate more truly their struggles and work.

History

Tuberculosis, considered not as a disease but as a scientific problem, furnishes an excellent example of how the dark unknown was penetrated.

The earliest knowledge of tuberculosis dates back to the ancient peoples. When this disease attacks bones, it leaves certain identifying marks. In the mummified bodies of the early Egyptians, such evidences of the disease have been found by modern students. Therefore, we may conclude that tuberculosis afflicted the people of Egypt before the time of written history.

Hippocrates, who lived from 460 to 377 B.C., is called the Father of Medicine. Before Hippocrates' time, disease was generally regarded as the expression of the displeasure of the gods and due to the malign influence of demons. However Hippocrates destroyed that idea. He strove to account for disease by studying its natural history. His description of phthisis, or tuberculosis was so accurate and so picturesque that it has a modern ring even today. He did not know the cause of tuberculosis, how it was acquired or what took place in the lung. His ideas of treatment were vague, although he recognized the value of good food and good health practices.

The Greek school of medicine, which sprang from Hippocrates' teachings, long dominated medical thought. During the middle ages further progress was slow and few scientific advances were made. Men were content to accept the teachings of the "masters" long since dead, and research was discouraged. Tuberculosis was generally regarded as a hopeless malady. Nothing was known to cure it, and how it was spread was a dark secret.

Not until the seventeenth century when Sylvius first described tubercules did men begin to learn something of its characteristics.

Explorers on The Trail.

Sylvius found little nodules like grains of sand in the lungs of those who had died of tuberculosis. He did not understand their nature and wrongly assumed that they were lymphatic glands of the lungs.

Morton in 1689 definitely associated such tubercles with tuberculosis and believed that they always preceded the disease.

Bayle (1774-1816) proved Morton's theory by tracing tubercles thru the successive stages of tuberculosis. He showed that when many such tubercles unite, they form a large nodule or tubercle, which later may break down, leaving a cavity in the lung.

Laennec, a brilliant French physician, developed the stethoscope in 1819. He himself had tuberculosis and devoted his life to the study of the disease. He proved that scrofula, a disease very common in the eighteenth century, was in reality tuberculosis, evidenced especially by diseased glands. He clarified the confused knowledge of tuberculosis of that period.

He invented the stethoscope. The first one was simply a hollow paper tube, one end of which was placed on the patient's chest, the other at the doctor's ear. By this method he could listen to what was taking place in the lung. Laennec's contribution to the knowledge of tuberculosis was of great importance and his followers all based their work on his findings.

J.A.Villemin, in 1865, experimenting on guinea pigs, showed that tuberculosis is a contagious disease. Just what the virus that caused it might be he did not know, but he proved that it could be passed from one animal to another.

Tappenheimer in 1877 caused dogs to develop tuberculosis by

allowing them to inhale sputum from a tuberculous patient, showing that the virus is in the sputum of those who have the disease. Several other workers at about this time produced the disease in animals by feeding them milk from cows that had tuberculosis.

Louis Pasteur about 1855 began work which opened a new era in medical science thru his discovery that tiny, microscopic germs are the causes of many diseases. He laid the foundation for the science of bacteriology and may be called the Father of Preventive Medicine.

At this time Robert Koch, 1882, an obscure country doctor was reading of Pasteurs work and began some experiments himself. He worked out methods of growing the germ in his small laboratory and proved that the tubercle bacillus is the direct and only cause of tuberculosis. The tubercle bacillus has a very resistant outer covering consisting of wax, therefore it was difficult to stain it, for examination under the microscope until Koch devised a special method of doing so. His discovery of the actual cause of tuberculosis gave new impetus to the search for the solution of the emancipation of mankind from this dreaded disease. Koch's work is one of the greatest scientific achievements in the field of medicine.

While experimenting with a new form of electric light produced by the Cathode lamp, Roentgen found that there are certain rays of light that penetrate opaque objects. The x-ray, as he called it, was used at first only for locating fractures and dislocations of bones and for discovering foreign bodies in various parts of the body. Today the x-ray has made the diagnosis of many diseases more certain and precise. As an aid in diagnosing tuberculosis, even in its very early stages before there are symptoms it is invaluable.

Another interesting highlight in the history of tuberculosis

is the work of Theobald Smith. He proved in 1898 that there are at least two types or families of tubercle bacilli. The bovine type causing disease in cows; the human type causing disease in man. Later it was proved that the bovine bacillus may also cause tuberculosis in man. Milk from tuberculous cows, unless pasteurized, is of great danger to babies and children.

With the turn of the century Carl Nageli, after performing hundreds of autopsies announced that he believed nearly every adult had tuberculosis at some time in his life. Often not serious enough to cause much trouble. This caused much confusion but inspired the medical world to set about to find a way of proving this statement.

In 1907 Clemens Von Pirquet modified the tuberculin test previously devised by Koch so that it could be applied simply and safely on large numbers of persons. Widespread use of the tuberculin test which shows whether or not the tubercle bacillus has entered the body, demonstrated that one may be infected with the germ yet not have the disease. Thus, it was learned that Koch's idea that the germ causes tuberculosis is not inconsistent with Nageli's finding that most adults show evidences of the disease. The tuberculin test is one of the most valuable aids, especially in detecting the beginning of tuberculosis in children.

Thus we see the many men who have devoted their lives to developing methods of treating the disease and of its discovery. No longer do we need to grope in darkness and dispair when tuberculosis over takes us. We know the cause of the disease also the <u>how</u> of recovering from it, so it is our problem to apply the knowledge at hand and make a speedy recovery or better still prevent its spread.

Along with the development of methods of discovering the disease and its control we find in 1887 Sir Robert Philip of

Edinburgh establishing a dispensary. A.Rollier, a Swiss surgeon, believed that sunlight is a powerful source of healing especially in cases of bone tuberculosis. So in 1903 he opened the first clinic for sun treatment at Leysin in the Tyrolian Alps.

On The Lookout For The Foe.

Because tuberculosis usually creeps upon us like a thief from behind we must be on the lookout for the shadows that he casts before him. There are four common signs that give us warning. They are extreme tiredness, loss of weight, indigestion and a cough that hangs on. However in some instances the disease may be present without a single symptom, therefore it behooves each individual to have a thorough physical examination once a year by his family physician.

Few people are worried by feeling a little tired or worn out now and then. It is natural to become tired after work or play, but the tiredness or fatigue that comes on too easily or for no good reason, the lazy feeling that lasts, is usually due to something wrong. It may or may not be tuberculosis. Neither poor appetite nor indigestion is a disease, but both are danger signs and there is a cause for them and a cause for the loss of weight. A cough that hangs on may be compared to a red traffic light--if ignored we get into trouble. A cough from a simple cold soon stops but one that hangs on for ten days or more is probably caused by something else and should be attended to at once.

It would be interesting to pause here and learn what the tubercle bacillus looks like and how it gets a start in the human body.

It is a slender rod-shaped germ that can only be seen under a microscope and is found in the sputum of a person having tuberculosis. It is so small that it can get into the body on specks of dust or in tiny droplets sprayed out during coughing or sneezing. A thousand can pass thru a pinhole at once. They live for several hours in moist sputum and may resist drying and freezing. However they die

in a few minutes in boiling water and in a few hours in sunlight or fresh air.

The tubercle bacilli is passed from person to person in numerous ways. Careless people spit on the floor and sidewalks. Tubercle bacilli may be in their sputum and if it is mixed with dust some of these bacilli may be blown about and breathed in by anyone passing by. Children play on the floor and sidewalk, soil their hands and playthings and later may carry the bacilli from their hands into their mouths. Bacilli may be left on a spoon, drinking cup, whistle, pencil or pipe--and the next person who puts one of these articles into his mouth gives the bacilli a chance to get into his own body.

If a cow has tuberculosis the bacilli may get into her milk. The person who drinks that milk carries the bacilli directly into his body unless the milk has been properly pasteurized or boiled.

The above are ways of acquiring tuberculosis indirectly, however there are ways of getting it by direct contact. A tuberculous mother who kisses her child on the mouth is almost sure to plant some of her bacilli in the body of her child. Other members of a household may not know they have tuberculosis and by kissing children give them the disease.

When tubercle bacilli get into the body they may be sneezed or coughed out before any damage is done. If they get into the blood stream they may be destroyed by the white cells in the blood. If they escape these natural defences of the body they lodge in some part of the body, usually the lungs.

The tubercle bacillus is a foreign substance in the body and we find certain cells gathering around the bacilli to form a capsule or shell around it. This is called a tubercle inside of which

bacilli continue to grow and to destroy the small amount of lung substance locked up with them. There they may perish without having done any real harm to the lung. In time a hard substance called calcium takes the place of the destroyed tissue and the little tubercle becomes hard and stony. Because the bacilli is alive it has the power of making other bacilli like itself. In the lung where it is warm, dark, and moist the bacilli grow rapidly in number. Then there is a race between the power of the cells to hem the bacilli in, and the ability of the bacilli to grow fast enough to escape. Some bacilli may and usually do get into the nearby lymph glands and cause the same damage as they do in the lung. The glands are repaired in the same manner as is the lung tissue.

So long as the body keeps the upper hand, all is well but let the bacilli multiply too fast, or allow the body to lose its fighting power and the person becomes ill. This often happens at about the time boys and girls are in their 'teens or about twenty years of age. It is then that they tend to "burn the candle at both ends". They either go to school and study hard or go to work and work too hard trying to squeeze in some play and do not get enough rest and sleep, two things so inexpensive and so essential to good health. They may also grow careless in eating habits and the selection of a balanced diet.

Only the tubercle bacillus can cause tuberculosis therefore we should be careful to avoid those who have the disease and who are careless. And in maintaining a good state of health one can easily overcome the few casual contacts he may make with the disease and not know about it.

However a child who lives daily with a person who has active

tuberculosis is in constant danger--unless everyone in such a household understands and does everything possible to prevent the bacilli from spreading.

Other parts of the body may be attacked by the tubercle bacilli besides the lungs, the lungs however are the usual organ for the disease. There may be tuberculosis of the bones or joints causing a stiff knee, hip or elbow and sometimes hunchback. There may be tuberculosis of the glands especially in the neck and sometimes called scrofula, this particular type is fast disappearing. More rarely now than in the past do we find people who have intestinal tuberculosis. Before dairy herds were immunized against tuberculosis many children who drank milk from tuberculous cows had intestinal tuberculosis. Sometimes we find a person suffering from pulmonary tuberculosis, also has intestinal tuberculosis due perhaps to his swallowing some sputum which is laden with tubercle bacilli.

The kidneys and bladder and occassionally the genital organs become infected but usually are secondary to an advanced case of pulmonary tuberculosis. The eyes and ears may become involved but this is rare. The throat often becomes infected when the lungs are infected due to much coughing and expectoration of sputum. When the throat is tuberculous the voice becomes hoarse and sometimes is entirely lost.

Whatever part of the body is infected by the tubercle bacillus care should be exercised in contact with other people in order to keep from spreading the bacilli. The patient should place himself under medical care at once.

Treatment, General.

The treatment of tuberculosis was, until recently, very unsatisfactory. Blood letting, a form of treatment common during the last century, was usually employed. Drugs and concoctions of all kinds were administered, and patients were usually bundled up and kept in warm rooms with no ventilation.

George Bodington in 1840 departed from the usual method and advocated rest and fresh air. But his ideas were so new and so severly criticized that he became discouraged and closed the institution he had established in England.

In 1859 Brehmer, a German physician opened a sanatorium for tuberculosis cases and this is generally credited as being the first tuberculosis sanatorium in the world. It was located in the Black Forest in southern Germany. Here life in the open, rest and carefully supervised exercise was the keynote of his treatment.

In the United States the first tuberculosis sanatorium was established by Edward L. Trudeau in 1885 at Saranec Lake, New York. The story of Dr. Trudeau's life and effort in combating tuberculosis from which he suffered is most inspiring. Many discouragements and knotty problems confronted him in his attempt to find a means of effecting a cure. In the midst of hardships but with rest, plenty of fresh air and good food Trudeau gradually improved his own health. The first sanatorium was a little red cottage built on top of a hill and still stands today as a memorial to Trudeau. It is now surrounded by a splendid array of modern buildings where many are recovering from tuberculosis. This was the beginning of sanatorium treatment. Today there are more than 600 sanatoria in the United States with over 70,000 beds. While many tuberculous people want to go to the arid

west for sanatorium care it has been proven that climate has little to do with the cure. The most important things are rest, fresh air and good food and these may be found in any section of the United States.

The best place to take the cure is at a sanatorium. Here everything has been planned for the purpose of helping the patient regain his health. Here he is protected from the big and little worries of the home. He need have no fear that he may be exposing any of his loved ones to the disease. Here he is one of a group with the same aim and same problems. Everybody about him is cheerful or at least hopeful. He is forced to rest and he needn't bother about fresh air or the correct diet for both are planned for him. He has good medical supervision and a nurse is always at hand. Here he may have treatments by specialists for his particular needs. In reality the sanatorium is a training school in which he learns how to adjust himself to a new kind of life in which he must be an expert at learning the art of really resting if he expects to make any progress. He not only learns how to get well but how to maintain good health.

Special Treatment.

In general the treatment is rest, fresh air and good food but many cases require more than that because the disease has obtained such a foothold.

Rest of the diseased lung may be increased by a slight operation, called phrenicectomy of one of the nerves in the neck. This causes the diaphragm to rise and decrease the space about the infected lung thus causing it to rest more because it cannot expand so much with breathing. Another treatment is to collapse the diseased lung by putting air in the pleural sac between the chest wall and the lung. This is known as pneumothorax. This method is safe and causes little pain. In some cases there is a complete collapse and the lung can heal much more quickly. The other lung should be either free or almost free from disease because it has to function for the entire body. Occassionally there is a natural collapse of the diseased lung but usually we use artificial collapse. In giving pneumothorax treatments the treatment has to be repeated often, because the air is absorbed. If necessary the lung may be kept collapsed for several years. The patient may have negative sputum and be able to return home without danger to any-one if he takes good care of himself.

As a last resort thoracoplasty is used. In such a case all other treatments fail and in order to arrest the disease part of the ribs are removed and the infected lung is permanently collapsed. The patient then must depend upon one lung for his air supply and for that reason the remaining lung should be in good condition. Many people after having this more serious operation recover and are able to return to a normal life providing they observe the rules of rest and good health they have previously learned in the sanatorium.

In a case of intestinal tuberculosis the patient beside general tuberculosis care should have a bland diet and one with special emphasis upon tomato and orange juice. Ultra Violet light may be used to good advantage also.

In treating laryngeal tuberculosis the patient must be on absolute silence. When his condition permits he may whisper but absolute rest of the voice is essential. Ultra Violet light may be used by using reflectors and throwing the light into the throat. If ulcers appear the cautery may have to be used. This is usually quite painful and there is always loss of appetite and the general condition and primary infection are affected unfavorably.

There is only one treatment for tuberculosis of the kidney and that is surgical removal of the infected organ. Tuberculosis of the genito-urinary tract is usually secondary to tuberculosis of the kidney and when the kidney is removed the other affected parts heal in time.

Generally speaking tuberculosis in any part of the body is usually secondary to a primary infection in the lungs.

It is surprising how quickly most people improve after a few weeks of bed rest. The temperature goes down, the cough stops and the patient begins to gain in weight. Too often the patient thinks he is well enough to get up and go to work. Herein the danger lies because the x-ray will show that altho some progress has been made there is yet much ground to be covered before the patient is arrested or cured. The wise patient sticks to the rules of the cure long after he <u>feels</u> well.

The best method of combating the disease is preventing it from spreading. The newest method is tuberculin testing especially among

school children. The test itself is harmless and does not contain tubercle bacilli but is a protein substance that will cause a redness around the place on the arm where the tuberculin has been applied. A reaction does not mean that the person now has active tuberculosis but that at some time he has had a slight attack perhaps. It indicates that the child has been in contact with an active case and because he may be in contact still a check on his associates is made beginning in his home. Sometimes the contact is outside the family circle. In any case it helps to locate active cases and enables the doctor to isolate the active case in a sanatorium so that new cases will not develop. Children who do not have active infection but react positively to tuberculin should be checked regularly to see that they do not become active cases.

Whoever cares for a tuberculous patient whether it be in a home or hospital or sanatorium should remember to wash his hands frequently and well. Hot water and soap will destroy the bacilli. Sputum should always be placed in paper bags by the patient and then burned. Linens should be thoroughly washed, preferably boiled. Blankets and sweaters, pillows and mattresses should be well aired and left in the sun.

Economic Aspect of Tuberculosis.

The role of tuberculosis as a cause of unemployment and the relationship of confined and dusty occupations to the disease, have long been recognized; but the possibility of providing some practical solution of the economic problem resulting from tuberculosis has not received the attention it merits.

The wage earner who is attacked by this disease has sooner or later to cease work, either thru physical inability to continue or because he has to undergo a term of treatment in a sanatorium or hospital. In the case of the unskilled worker or casual laborer the vacancy is immediately filled. If the patient is a skilled worker, his place may or may not be retained for him, according to his prospects of recovery and the extent to which his services are of value to his employer. If the occupation which has been followed is in any way responsible for the development of the disease, the patient when restored to health and working capacity will prefer the risk of unemployment to resuming a form of work which will, in all probability, be responsible for relapse and a further breakdown in health.

Tuberculosis represents a loss to the nation of many millions per year. It is a frequent cause of death at the most active stage of life when the capacity for work and earning wages stands at its highest level, and when the family of the wage-earner who is stricken down by the disease is entirely dependent for the necessities of life upon his wage earning power. The annual loss in human lives alone is large and the loss in wages and work by disability produced by this disease also represents a large sum of money.

Of special importance in relation to the economic side of the tuberculosis problem is the fact that graduated manual labor has become

recognized as an important and essential principle in sanatorium treatment. In the up-to-date modern sanatorium, as soon as his physical condition permits, the tuberculous patient is given outside manual work to do. As the general health and working capacity improve, heavier work is undertaken, until the patient is able to do the heavier graded work with comparative ease, and with distinct benefit to his health and physical well being. This system of graduated manual labor has a marked two-fold effect on the patient. It exercises a beneficial general effect, inasmuch as it improves the circulation and muscular tone of the individual, and reestablishes partially or completely his capacity for work. Secondly, it has a distinctive local effect by the induction of a controlled auto-inoculation which tends to promote healing of the disease focus in the lung. On the other hand if the work proves too heavy the patient knows just what his limitations are and can work accordingly.

The weak point in sanatorium treatment is that, while it takes stock of the immediate requirements of the tuberculous patient it offers no facilities for maintaining arrest and economic cure when these have been obtained. Discharge from the sanatorium at the present time constitutes so sharp a break in the ordered routine and conditions of the patient's life that a relaps too frequently follows.

Unhealthy home conditions, unemployment with its consequent insufficiency of food, mental worry and anxiety are incompatible with a continuance of the economically beneficial results obtained by treatment in a sanatorium.

The question of present and future employment should therefore be intimately linked with sanatorium treatment thru out its whole course. Economically therefore the most important result of modern sanatorium

treatment is the improvment which takes place in the working capacity of the patient as he may even have to learn a new trade.

The work must necessarily vary in degree according to the stage and type of the disease. In the majority of those in the early stage of the disease the capacity for work is fully if not permanently restored. In others the capacity is partially restored. The far advanced patient cannot regain this capacity.

The individual who has been attacked by tuberculosis and who has had his capacity for work restored by a term of treatment, or the person who is susceptible to or threatened with tuberculosis should be placed under conditions of life and employment which are calculated to assist him in maintaining at a satisfactory level his health and ability to earn his livlihood.

Occupations best suited for the arrested tuberculous patient are those which allow him to remain outdoors or in well ventilated buildings free from dust and which do not make too great a demand on his physical strength. Many either have to remain unemployed or return to the hazards of their old jobs. The patient should be trained in his new occupation while taking his treatment in the sanatorium. This depends on his physical condition and his adaptability. Afforestation, market gardening, poultry keeping, bee keeping and certain indoor occupations in healthy open-air workshops may be considered.

In New Zealand large tracts of land were planted with young trees by the government and a tree planting camp was started for patients who had been cured at the government sanatorium. The men were paid the usual rate of wage for planting trees and this scheme was successful. The cultivation of beets may be employed with good results. The revival of rural industry and village life is of importance in

relation to national health as it will secure an increased rural population which would provide for an increased national protection against the ravages of tuberculosis. The cured tuberculous patient should be well fed, well clothed, have an abundance of fresh air and some employment suitable to his physical condition if he is to be a national asset. In many cases part time employment is necessary. By grading the work according to the capacity of the individual a return to full working capacity is more likely to be attained, while the risk of relapse from overstrain would be greatly reduced.

The Nurse and The Educational Program.

The first association to be established to fight tuberculosis was organized in Pennsylvania in 1892 by Dr. Lawrence Flick. Today, each state in the Union has its tuberculosis or health association and in addition there are about 1400 smaller associations in towns, cities and counties.

In 1897 Dr. Hermann Biggs secured the compulsory reporting of all cases of tuberculosis by physicians in New York City.

In 1898 Sir William Osler put to work two young women medical students to follow up cases of tuberculosis in their homes to see that the physicians instructions were being carried out and that other members of the family were being protected. Soon after, in 1903, tuberculosis nurses began work in New York City. Looking after persons who have tuberculosis, or who are post sanatorium cases, and their families is today a large part of the work of public health nurses.

In 1904 a number of efforts were made to organize the campaign against tuberculosis into a national association. Workers representing these various attempts met in Baltimore on the occassion of the tuberculosis exhibit and, as a result of this and two later meetings the National Tuberculosis Association was formed, with Dr. Edward L. Trudeau as its first president. With the help of The American Red Cross this Association was financed and continued to grow. Today the program is financed thru the Christmas Seal Sales and by membership dues.

The National Tuberculosis Association serves as a clearing house for information on all phases of tuberculosis for individuals and for organizations. It furnishes supplies and publicity material,

thus improving the quality of printed matter. It serves the affiliated associations thru field visits of the staff to assist and advise on medical care, after-care, child health, legislative activities, statistical service, training of workers, and in the development of local health organizations and their programs.

In the beginning the Association was organized for the study and prevention of tuberculosis therefore research work has been encouraged from the beginning. The Committee on Medical Research has conducted various research projects and made scientific advances each year in better control methods. In recent years a committee on Social Research has been functioning.

Since 1917 the Review, a magazine published by this Association has been the only magazine devoted exclusively to scientific articles on tuberculosis in the United States. Its circulation is world-wide.

In order to impress upon the public the need for early discovery of tuberculosis when there is far more chance for recovery, the association for several years has carried on a series of Spring Educational Campaigns. Publicity of all kinds, including motion pictures, pamphlets, posters, radio talks and newspaper stories, has helped to keep the public reminded of the need for tuberculosis prevention throughout the year.

Recently there has been a motion picture released entitled "Contacts" which carries in vivid form the idea of how tuberculosis is spread. It is one of the best methods of carrying on an adult education program. Many people do not or will not take the time to read the literature describing the disease and how it may be prevented so this is an easy way to present the problem to them. This film may be used in any local theatre and in connection with some

popular current show.

The statistical department has had an important role in that it has compiled figures and presented facts about existing conditions and problems in controlling tuberculosis. In 1900 the death rate from tuberculosis in the United States was 200 per 100,000 population. It has been reduced to 56 per 100,000 population in 1935. Thus proving the value of organized effort in gaining control of the disease. Now we find that among women the death rate is highest between the ages of 15 to 25 years. And for men the age is from 30 to 50 years. This fact sets aside a certain group upon whom to concentrate efforts in preventing the young adults from contracting the disease. This may be done by tuberculin testing and use of the x-ray in discovering the disease before it becomes a far advanced case.

According to statictics we learn that the white race has a lower death rate than does the colored race. Generally speaking the negro death rate is two and one-half to three times that of the white race.

An instructive and interesting magazine is published by the association each month, it is Outdoor life. The patients as well as lay people may read articles on tuberculosis and learn how to develop better methods of healthful living.

While there have been no outstanding single discoveries within recent years, great strides have been made in putting together and applying existing knowledge. Diagnostic and treatment techniques are steadily being perfected and methods of control are becoming increasingly efficient.

The plan of the Research Committee is to utilize the already existing universities and other laboratories in the United States to carry out specific research projects laid down and approved by the

committee. In order that the various institutions and workers may not be operating at cross purposes, each individual project is carefully supervised and coordinated thereby eliminating unrelated problems. The laboratories of some twenty or more different universities and other institutions have been put at the disposal of the Association for its research work and the staffs of these various institutions, including some of the finest specialists that the country has produced, are giving their services gladly for the development of the research program in the hope that a specific cure may some day be found for tuberculosis.

Most cities are fairly well organized in caring for the health of the people and control of disease in their limits. When we go to the rural field there is often a different picture. In the future the well trained wide awake public health nurse will find much work and many problems. In spite of the vast progress made in the past twenty-five years no effort has yet been made to deal adequately with the health problems of rural localities.

Some of the factors retarding the progress of rural public health, as promoted by the Tuberculosis Association, are unimproved roads, isolated sections, lack of economic resources, traditional conservatism and lack of qualified public health nurses. Rural public health still remains in the pioneer stage of development and does not as yet command a wide measure of public support.

The public health nurse who goes into the field must accept problems not directly tuberculosis problems. Some are social in fact few families are free from some kind of social problem and the efficient nurse will study and help solve such existing problems in carrying on her work for the Health Association. Social problems and

health problems exist side by side in the same family and in the same community. The technique of case work is as applicable to the field of health as it is to social service. An intimate understanding of human nature and knowledge of the principles of social control are fundamental requirements of public health nurses.

By careful planning and a real desire to be of service the well trained public health nurse can do much to prevent the spread of all diseases as well as tuberculosis. First of all she must win the confidence of the groups with whom she works then she may lead them far in the direction of good health.

Then it is hoped that every person may understand that "Health is that quality of life which enables the individual to live most and serve best".

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