

ple. The work is well begun. The pessimists of a few years ago are the astonished optimists of to-day. Thousands of earnest workers are now in the field where not a corporal's guard stood when the writer began agitating this factor of public health five years ago.

HEREDITARY FACTORS IN TUBERCULOSIS.*

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The hereditary factors are regarded as being less influential at the present day than was held prior to Koch's important discovery of the tubercle bacillus. It has been conclusively shown that direct hereditary transmission is an exceptional occurrence. Hauser, in an extensive and careful review of all previous work upon this question, reached the conclusion that there are only 18 authentic instances of direct inheritance of this disease to be found in the literature. In all of these cases only the mother had tuberculosis. He contends that conclusive proof of direct transmission from the father is wanting and this position is probably the correct one. Hauser attempted to produce experimental direct hereditary transmission in guinea-pigs and rabbits, and in a single animal only was he successful, and this had been kept alive for months after birth. He decided that the theory of direct inheritance rests on insufficient evidence.

Birch Hirschfeld found that even though the fetus itself may show no evidence of tuberculosis, the fetal viscera may yet be infective to guinea-pigs. Baumgarten also believes that the contagion may be transmitted and become pathogenic at a variable period after birth. To support this view is the fact that certain structures not apt to be accidentally infected are commonly the seat of tuberculous lesions in children, as the bones and joints. Kuss disputes the theory of latency of tubercle bacilli until childhood or later in life. He contends that these latent foci do not exist before the age of three months; and that they are rare before the end of the first year of life.

Whilst it must be conceded that intrauterine infection is the exception, and although there is practically no hereditary tuberculosis there is a hereditary predisposition, which invites infection. In what does this predisposition consist? This is a pertinent question. Otis, of Boston, contends that heredity means poor vitality from birth and that subjects who manifest the same conditions without the influence of heredity are to a like extent predisposed.

It is well known that as the result of an unfavorable environment a predisposition to tuberculosis may be acquired. Hence, there is danger of confounding this condition of the system with inherited predisposition. Again, the latter form of predisposition is constantly being confounded with latent forms of tuberculosis, whether acquired or inherited. Although there is no harmonious agreement concerning its use and value, I feel convinced that we possess in tuberculin an agent by means of which existing latent tuberculosis can be reliably discriminated from mere predisposition. The question of dosage is vitally important. I have a fixed belief that greater uniformity of results of Koch's method would follow, if medium-sized initial doses—from 2 to 5 milligrams—were employed. As elsewhere stated, this would obviate the necessity of repeated injection, as is generally the case when small commencing doses—

from half a milligram to a milligram—are used. Accurate results in most reactive cases could be expected, and an increased dose, if the repetition were actually demanded, would be unattended by any risk for the patient.

But even after eliminating in this manner, latent and obscure forms of tuberculosis, I know of no way in which to estimate with precision the percentage of cases in which the predisposition is inherited. That the proportion of cases is smaller than had been held prior to the important discovery of the bacillus tuberculosis is unquestionably true. On the other hand, my personal experience and observation is entirely confirmatory of the fact that individuals belonging to a family in which tuberculosis is distinctly traceable are more prone to the disease than similar constitutions or persons who have no tuberculous family history. This is even more true of the cases of phthisis that occur in individuals possessing a robust build. Indeed, I fear that in consequence of the modification of professional opinion in recent times relative to the question of heredity, there is danger that too little attention is now and will be in future given to the question of family history. In support of this position, I may be allowed to quote Allbutt, who forcibly remarks, "every physician engaged in practice among the classes in which family history can be acquired is morally convinced of the bias of many families to tuberculosis, however their circumstances may appear; a bias often revealed at the attainment of a certain age." Dock and Chadbourne in a statistical study of this subject also conclude that multiple appearance is commoner in families with tuberculous parents.

After making due allowances for all modifying circumstances, particularly accidental infection, including especially infected homes and prolonged contact with tuberculous subjects, I entertain no doubt that a predisposition to this affection may be inherited, and this tendency is more unfailingly transmitted through the mother than the father. It is analogous to the heightened receptivity or susceptibility that is observed throughout successive generations in certain families, to typhoid fever or acute articular rheumatism. Finally, this increased susceptibility, which we note in a limited number of families, is dependent on a lack of resistance of the animal-cell and the latter condition in turn on a faulty metabolism or nutrition.

TUBERCULOSIS AND INSURANCE.*

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This subject, in order to be thoroughly discussed, must be considered from two standpoints, which are almost diametrically opposed to each other and which can, therefore, hardly be treated fairly by one individual. The two sides of the case relate to the business and the benevolent features. From my standpoint as a holder of several policies in mutual companies, I am necessarily more interested in the business aspect. Although I highly appreciate the benefits that might follow to many widows and orphans from a benevolent, or perhaps I might say a charitable, management of these great trusts, nevertheless, we must all admit the wisdom of the rule, "never mix business and charity." I take it therefore that what is for the best interests of the company itself, and for the best interests of the thousands

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who are insured in mutual companies, is really what will be the greatest good to the greatest number.

Statistics from the mortuary tables of several of the largest companies in this country show that fifty years ago over 20 per cent. of the deaths were the result of tuberculosis. Until Koch's discovery very few cases besides those of pulmonary consumption were recognized as tuberculous diseases; therefore, it seems probable that nearly half the deaths of persons insured fifty years ago were from tuberculosis; but whatever the number may have been, business methods certainly require exercise of the greatest care to exclude undesirable risks.

I have been told by officials of life insurance companies that medical examinations appear to reduce their death-rates only during the first six years of the life of policies; but a large percentage of policies lapse or are surrendered during the first six years. These facts emphasize the necessity for the most thorough medical examinations if an insurance company is to do a safe business. The points which appear of greatest importance in this examination and to which the examiner should give greatest attention are:

1. Weight, which in a general way determines the state of the nutritive functions better than anything else. The abnormally light body in a large percentage of cases is the one that will sooner or later become tubercular.

2. Poor digestion. This often causes the light weight and indicates feeble resisting power, which makes the individual peculiarly vulnerable to tuberculosis. In many these two symptoms indicate that the tuberculous process is already established.

3. Pulse. Although there are many healthy persons in whom the pulse is easily accelerated and although it is above 80, while standing, in the majority of men brought in for life insurance examination, yet a persistently fast pulse of 100 to 120 must be looked on as one of the most frequent symptoms of tuberculosis.

4. Frequent attacks of bronchitis. It appears to me very doubtful or even improbable that catarrhal bronchitis often leads to pulmonary tuberculosis, yet if we accept the statements of applicants we must not forget that these so-called attacks are often only exacerbations of the symptoms of pulmonary tuberculosis.

5. Frequent pneumonia. Repeated attacks of pneumonia must leave the lung in a crippled condition, which, other things being equal, would favor the development of pulmonary tuberculosis; yet recovery from pneumonia may in some instances be considered a most favorable prognostic, indicating that the individual is immune to tuberculosis.

6. Repeated attacks of pleurisy appear to be usually of tuberculous origin.

7. Heredity. It is a rule with some of the best companies to reject all risks where a parent and one brother or sister have died of consumption, unless the applicant has passed the age of 35. I believe this a prudent precaution, essential to the welfare of all policy holders in mutual companies. In recent years many physicians of large experience have come to doubt the importance of this factor, and it has not been difficult to find statistics to support their contention, because in nearly all statistics the most important factor is ignored or can not be found. The missing factor is: How many cases would have occurred without hereditary predisposition?

The fact that the Brompton Hospital reports show that one parent has had phthisis in nearly 25 per cent. of the cases of consumption does not by any means

show that neither parent has suffered from phthisis in the other 75 per cent., nor yet that there would not have been an equal number of deaths from this disease if neither parent had suffered from it. The same may be said of Fuller's statistics, which show that when parents, grandparents and uncles and aunts are considered, 59.5 per cent. of the antecedents have had pulmonary tuberculosis. Williams' figures show that out of 484 cases of phthisis in which some of the relations had died of the disease, in 224, or over 46 per cent., the relationship was that of brother or sister. If these could be added to the above figures, probably not far from 80 per cent. of all cases would show hereditary predisposition, which is the whole percentage of the human race that are now believed to have tuberculosis at one time or another in some form.

When we take into consideration the missing factor we must admit that even these overwhelming figures prove nothing; and in fairness we must allow for common environment and contagion, the first of which might explain in some cases the occurrence of two or more cases of consumption in one family. Osler states that in 427 cases in the Johns Hopkins Hospital, 25, or nearly 6 per cent., occurred in married people where the husband and wife had suffered from the same disease. This is grasped by some as proof of contagion, but there is no accompanying proof that the relatives of these persons did not have tuberculosis in some form.

Direct transmission of the bacilli from mother to offspring has now been proved in several cases, though this must be very infrequent. Every one is familiar with the marvelous influence of heredity in perpetuating mental as well as physical peculiarities, or predisposition or immunity to some other disease, such as croup, measles, scarlet fever, smallpox, etc., numerous interesting examples of which might be given; then why should we question the transmission of that peculiarity which renders some susceptible to tuberculosis and enables others to withstand all the attacks of the bacilli and their toxins?

The records of the Paris morgue and several laboratory observations have shown that in healthy bodies, of those dying from accident, suicide or acute disease, tubercle bacilli may be found in a large percentage; or scars from previous tubercular foci are present. In 125 autopsies in the Foundlings' Hospital of New York, tubercle bacilli were found in the bronchial glands in every case. These various facts render it probable that all of us harbor the tubercle bacilli at some time, but if we inherit strong constitutions and avoid vicious environment we need not die of tuberculosis.

As examples of hereditary influence that can not be explained by the theory of contagion or similar environment, I may briefly mention two families among by personal friends. In a family with 12 adult brothers and sisters, the father had light eyes and the mother, who died of consumption, had dark eyes; three of the dark-eyed children, after they had left the parental roof and had homes of their own, died of pulmonary tuberculosis, though not subject to contagion and although living under entirely different environment. Another dark-eyed sister lost two dark-eyed children after they were grown, though her light-eyed son, who was constantly with his brother and sister, escaped. In the other family, the father when a young man suffered from consumption but recovered. His four children after arriving at adult life died of consumption, though under very different environment.

8. Hemoptysis. Cases of hemoptysis without other evidence of tuberculosis, or at least cases of hemoptysis

that have not been followed by recognizable tuberculosis, are fairly numerous, yet those who have had much to do with pulmonary consumption must admit that in the great majority of cases hemorrhage from the lungs or air-passages result from this cause; therefore, the rule that no applicant for insurance who has had hemoptysis should be accepted, until ten years have elapsed after the last hemorrhage, seems strictly just from a business standpoint.

9. Temperature. Daily elevation of temperature of from 2 to 3 F. is a very frequent sign of tuberculosis, but we must not forget that a daily elevation of 1 to 1½ F., sometimes extending over several months, is common under a great variety of conditions, which are not followed by any evidence of tuberculosis, as, for example, in simple catarrhal inflammation.

10. Physical signs of loss of elasticity, or pulmonary consolidation. It seems needless to emphasize the importance of rigid examinations under favorable surroundings, and this necessity ought to impress on the companies the paramount importance of having applicants examined at the examiner's office, instead of elsewhere. Considering the great importance of careful selection, I am surprised that some companies, from false ideas of economy, pay fees that are wholly inadequate for competent and careful service. No matter how well disposed an examiner may be, he will not give any considerable part of his services in these cases gratuitously, and the company will obtain from him only the amount of skill and care that it pays for. Statistics from one of the large companies show that, by careful selection on the lines I have just enumerated, it has progressively reduced its death-rate from consumption from 20.8 per cent. in a thousand 50 years ago, to 5.5 per cent. in the last five thousand deaths among its insured.

Recurring to the question: Are there any conditions under which the tuberculous may be insured, with any kind of policy and at practicable rates? I may answer that most companies accept certain risks that are in all probability tuberculous, providing the heredity, the previous history, and the environment make it appear probable that the individual will live long enough to pay the cost of the particular kind of policy that is issued. These policies must be credited partly to benevolence, though with the safe company the business interest demands very good judgment and a high premium in such cases. There are many more cases that might be safely accepted for limited periods; but the insurance company must always estimate the possibility of error or undue sympathy on the part of the examiner; therefore, it can not take any chances. There are also certain companies that make a specialty of extra hazardous risks at proportionate premiums. These policies are sometimes most beneficent, but usually the rates are prohibitory.

UNITED STATES GENERAL HOSPITAL FOR TUBERCULOSIS AT FORT BAYARD, N. M.*

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An order issued by the War Department, August 28, 1899, authorized the surgeon-general to establish a general hospital at Fort Bayard, N. M., as a sanitarium for the treatment of officers and enlisted men of the army suffering from pulmonary tuberculosis, and also to provide therein for the care and treatment of discharged soldiers entitled to the benefits of the U. S. Soldiers'

Home, at Washington, D. C. Under the latter clause patients are enabled to remain under treatment indefinitely, even after their discharge from the army by reason of their physical disability or from expiration of their term of enlistment.

Fort Bayard was selected by the surgeon-general not only for its admirably suited climate but also because it was immediately available, its abandonment as a military post having been contemplated for some years, and, excepting for its isolation and difficulty of access, no better locality could have been chosen.

It is located in the arid mountainous region of Southern New Mexico, three miles from Bayard Station and ten miles from Silver City, both of which are on branches of the Santa Fé R. R. Having an altitude of 6040 feet, the climate permits of comfortable outdoor life during the entire year, and, excepting for the frequent high winds during the spring, is undoubtedly ideal.

When ordered to assume charge of the hospital I was directed to select and ship supplies as promptly as possible, to provide accommodations at once for a number of cases to be immediately transferred from the Soldiers' Home.

On my arrival, October 3, 1899, I found all the buildings, as well as the water and sewer systems, very much dilapidated, and extensive repairs and alterations, which were commenced at once, are still in progress.

The old post-hospital is now occupied as an infirmary for bedridden cases, including not only those in whom the disease is far advanced, but also the febrile cases, which are kept absolutely at rest until the subsidence of the fever.

The ambulant cases are obliged to remain outdoors at least eight hours daily during the entire year; they are not allowed to occupy their dormitories from 8 a.m. until 8 p.m., and the windows of the dormitories are always open. For those with severe cough, rooms with two beds are provided; the others are placed in rooms containing six and twelve beds and the convalescents are separated from those who still expectorate tubercle bacilli. All the patients are required to carry paper spit-cups, which must not be used longer than twenty-four hours and are then burned, and the orders against expectorating elsewhere are rigidly enforced. The alvine discharges of infirmary cases with intestinal tuberculosis are destroyed in a crematory.

Recognizing that the problem in the treatment of tuberculosis is essentially one of nutrition, no efforts are spared to provide abundant good and nutritious food. All the patients are weighed weekly, and the comparative report of such weights is regarded as an index of their general progress.

From Oct. 4, till Aug. 6, 1900, 165 patients were admitted, with results as follows:

	Discharged.	Remaining.
Not improved	14	21
Improved	20	54
Convalescent	11	26
Cured	4	1
	49	102
Died	14	

Cases are recorded as *cured*, when, after all symptoms have disappeared, they fail to react to the tuberculin test. Those in whom no tubercle bacilli are found after repeated examinations and all active symptoms have disappeared, but they still react to the tuberculin test, are classed as *convalescent*.

Though we have not yet completed our first year, our experience thus far tends to disprove the general opinion

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