The Milroy Lectures

ON

THE HYGIENIC ASPECT OF THE COAL-MINING INDUSTRY IN THE UNITED KINGDOM.

DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS OF LONDON.

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LECTURE I.

MR. PRESIDENT AND GENTLEMEN,—In the first place, I wish to thank you for the great honour you have conferred upon me in appointing me to be the Milroy Lecturer for this year, and I specially appreciate this distinction because it gives me the opportunity of bringing before the College, as representing the medical profession, the hygienic aspect of what may be regarded as the most important industry in the United Kingdom—that of coal-mining.

Whether it be looked at from the point of view of numbers or of skilled work or from an economic aspect, it may be said that the coal-mining industry occupies the premier position of all industries in this country, and from a medical point of view the manifold problems which are associated with the coal-miner's life and work are of the greatest scientific interest, and at the same time they affect the life and well-being of all the workers engaged in this industry. More than a million men and boys are engaged in coal-mining in Great Britain, and they are distributed in the different coalfields in the various parts of the country. The miner's work is peculiar in that he not only works away from the light of day, but also because he is working underground in an atmosphere which has to be artificially treated to make it possible for him to conduct his daily work, and at great depths under varying conditions of temperature, humidity, and atmospheric pressure. His work involves a daily struggle with the forces of nature, and it is common knowledge that he is subject from the very nature of his employment to conditions which make this industry one of the most dangerous in which any man can find employment.

HISTORY OF THE INDUSTRY.

Although this country was celebrated for its mineral productions from the remotest times, we know nothing of the coal industry until the thirteenth century, although the Romans could not have been wholly unacquainted with coal during their occupation of the country.

The earliest records point to the sea coast of Northumberland and the shores of the Firth of Forth as the localities where the industry had its beginning, and in these districts the coal was found as an outcrop of the carboniferous strata which were exposed to the seashore. In the fifteenth and sixteenth centuries successful endeavours were made to obtain coal from greater depths, and with this development the natural ventilation of the mine became a matter of difficulty, and the gases of the mine were recognized as having a poisonous effect upon the miners. It is interesting to note that the first medical man who speaks of the question of poisonous gases of mines was the famous Dr. Caius, at one time President of the Royal College of Physicians, who, writing in the middle of the sixteenth century of certain coal mines in the northern part of Britain, said: "The unwholesome vapours whereof are so pernicious to the hired labourers that they would immediately destroy them if they did not get out of the way as soon as the flame of their lamps becomes blue and is consumed."

One of the earliest records of an accident due to fire-damp is that contained in the register of St. Mary's Church, Gateshead, in 1621, where reference is made to a man who was "burned in a pit"; and in 1640 an explosion is recorded in a colliery at Mostyn in Flintshire, which was sunk to the depth of between 20 and 30 fathoms. From time to time precautions of all kinds have been adopted with the object of preventing explosions, but un-

fortunately there has been no cessation in their occurrence up to the present day, even with the discovery of the safety lamp and the improvements which have taken place in the construction of this device from time to time. With increased knowledge and the application of science to the practice of mining, and even with the advantage of stringent mining laws and systematic inspections by trained engineers, at the present time we cannot say that the miner is free from the terrible risks.

The recent explosion at Senghenydd in South Wales has been the greatest mining disaster this country has ever experienced, 427 lives being lost, although the death roll in this case is easily surpassed by the Courrières disaster, which took place in the North of France in 1906, when 1,100 miners were killed.

DISTRIBUTION OF COALFIELDS.

The coalfields in this country are situated in the North of England, in the Midlands, South Wales, and Scotland, and there are undeveloped coalfields of considerable extent in Nottingham, South Yorkshire, and the south-east part of Kent, districts which are now given up to agriculture, but which in the near future may be coal-mining centres. In Ireland there are only between 800 and 900 employed.

The number of coal mines worked at the present time in this country approximate 3,300; 1,089,000 persons are engaged in or about the mines, of which number 879,000 work underground. Of the underground workers 50,000 are boys between the ages of 14 and 15. Of the surface workers, 210,000 in number, 6,500 are females, of whom 900 are under the age of 16. At the present time the law forbids females working underground, and the employment of women and girls on the surface is practically limited to Scotland and Lancashire.

During the last twenty years there has been an increase, steady and almost regular, in the number of employees in this industry.

CONDITIONS OF WORK UNDERGROUND.

The conditions of work underground depend to a large extent upon the depth and the temperature of the mine. Professor Cadman of Birmingham has published observations which have been made in many mines of different depths and in different parts of the globe with the object of finding the ratio of the increase of temperature with the increase of depth. The temperature of gradient, when measured in feet per increase of 1° F., differs from 49.2 to as much as 220 ft. per degree, but the average gradient for coal mines in Great Britain works out at about 72 ft. per 1° F. The temperature of mines may also be influenced by the direct oxidation of the coal seam during the process of mining, but from a medical point of view the consideration of the temperature of the mine air read with the wet bulb thermometer is what concerns us most from a practical standpoint with regard to the working efficiency of the collier whose work lies in mines of such temperatures. In a report of the Royal Commission on Mines on the ventilation of coal mines Cadman and Walley found in many mines the wet bulb readings exceeding 80° F., and in one instance 87° was recorded.

These considerations are of the greatest importance from a health point of view when applied to mines of great depth. There are many mines in this country at the present time over half a mile deep, and in Lancashire there is one mine whose depth approaches 4,000 ft. In the future, in the development of the unworked coal seams of this country, there is no doubt that the coal seams will only be obtained at increased depth.

With regard to the illumination of mines, one can only regret that with the most efficient forms of safety lamps the candle-power is so low. Speaking generally, the candle-power of the ordinary Davy lamp is only 0.12, while the types of lamps of improved pattern now generally used in coal mines rarely have a candle-power which exceeds 0.6, even when new and in a thoroughly clean condition. Electric lamps give a better light than the ordinary safety lamp, but it must be remembered that the functions of the safety lamp are not only those of illumination, but, equally important, they are the means by which in the hands of expert miners inflammable gas can be detected, and the great drawback to the employment of the electric lamp is that its only use is of

illumination, and therefore it can never be used universally without the concurrent use of the ordinary safety lamp.

The sanitation of mines is a question which has been entirely neglected in the mines of this country up to a few years ago, but now it is incumbent upon all colliery owners to provide proper sanitary arrangement in their mines. Through lack of sanitation, ankylostomiasis played a great havoc for many years among the coal-miners of Westphalia, Belgium, and Austria, and it was a piece of good luck for the English coal-miner that the mines of this country never became infected. An epidemic of typhoid fever which broke out among the miners at Leigh, in Lancashire, some years ago undoubtedly assumed serious proportions on account of the insanitary condition of the mines.

DOMESTIC CIRCUMSTANCES.

Considerable attention has been paid of late years to the housing conditions of miners. Mining villages have often to be created away from centres of population, and in too many instances the houses provided have been houses for miners and not homes for men, necessitating the special attention of the authorities. Where coalfields existed there soon arose a large number of mining villages and towns, and the vital statistics of a county were soon profoundly altered in consequence.

For instance, one may begin the subject of infantile mortality. A study of this rate in England and Wales shows that the infantile mortality is highest in the counties which are the seat of the textile industries and in those counties which are the centres of the mining industry. In the former there exists to a large extent the employment of female labour and of married women, but this factor in the case of mining can be ignored. Any inquiry into the cause of the high infant death-rate in mining communities soon leads to the consideration of the habits, and above all the domestic conditions under which the miner lives. The chief factors in the production of a high infantile mortality are poverty, intemperance, and defects of sanitation.

Poverty in the case of miners can be practically passed over as a determining agent, as it is much more likely to be secondary to other causes. The miner's wage is relatively a high one, and it is significant that police proceedings for drunkenness are highest in the mining counties. This, in itself, while pointing to intemperance as a contributory factor, opens up the question of habits, which is of no slight import in the investigation of death-rates, or of the sanitary conditions of the home. It may be briefly stated here that all the circumstances seem to have an interacting effect on each other, so that a vicious circle of conditions is continually in operation.

That the domestic circumstances of the miner are generally deplorable is evident from the reports of the medical officers of the mining counties in Scotland to the Local Government Board. From these reports it appears that in the counties of Midlothian, Linlithgow, Kinross, Stirling, Dumbarton, and Lanark, out of 33,355 houses occupied by miners, 18,582 (which is equivalent to 55.7 per cent. of the whole) are only two-roomed tenements, while 3,866 (or 11.3 per cent.) are only one-roomed dwellings. We thus see that of the mining houses in these counties 67 per cent. of them have only either one or two rooms.

In some districts the housing accommodation is so deficient near the mine that miners are obliged to walk considerable distances from their homes to their work. This is particularly the case where the mines are situated in some agricultural districts, and in North Staffordshire and Shropshire there are many cases where the miners walk or cycle six and seven miles to and from work at the beginning and end of the shift.

The mine owners of South Yorkshire and Nottinghamshire have recognized the advantages and the necessity of better housing conditions by providing houses that are larger, more sanitary, and are built in surroundings which admit of a freer and better ventilation, thus realizing that the social conditions of the miner form a very important part in the welfare of the whole industry.

MORTALITY OF MINERS.

Accidents are the chief danger to which miners are exposed in the course of their employment, and more deaths are attributable to accidents than to any other individual cause. The Registrar-General's returns for

England and Wales have consistently shown that the coal-mining industry has a higher mortality figure for accidents than all other industries, with the exception of seamen and fishermen and general labourers in industrial districts. Dr. Tatham's report to the Registrar-General for 1908 shows the comparative mortality from various causes of all males, both occupied and retired, and the corresponding figures for coal-miners.

	Mortality Figures from Accidents.
All occupied males	100
Platelayers, railway labourers, etc.	158
Railway engine-drivers, guards, etc.	174
Dock and wharf labourers	185
Coal-miners	212
General labourers in industrial districts	209
Bargemen and lightermen	407
Seamen, etc.	459

From this table it appears that the mortality figure from accidents is more than twice as great as the figure for accidents for the whole male community, which, of course, includes miners, and among miners it is nearly twice as great as that of diseases of the respiratory system. The lives of railway workers and dock and wharf labourers appear to be at great advantage as compared with that of a coal-miner.

It is, however, very satisfactory to note that among colliers the mortality figure from accidents has diminished by 25 per cent. during the last ten years.

Coal-miners appear to suffer to a large extent from diseases of the lungs; on the other hand, the death-rate from tuberculous phthisis is abnormally low, and it should be noted that deaths from alcoholism and diseases of the liver and of the kidneys are very much below the average of occupied men in this country. Further, while the figures due to accidents are abnormally high, the "mortality figure" from all causes of death is only 88 for coal-miners, as compared with 100 for all occupied males, indicating that as far as "mortality figures" show, the coal-miner's occupation compares favourably with that of the average worker.

FATAL ACCIDENTS.

From one cause or other in the last ten years 12,750 men and boys have been killed in the mines of this country. The average for these ten years is greater than the average for any of the three previous decades, but, if one estimates the death-rates from accidents per 1,000 persons employed, we find that for the last ten years, from 1903 to 1912, the average is 1.33, and it is lower than it has ever been before in any decade.

Between 1893 and 1902 the average was	1.39
Between 1883 and 1892 the average was	1.81
Between 1873 and 1882 the average was	2.24

The figures relate to all employed persons in and about collieries, including those who work on the surface. If one reviews the death-rate among underground workers only, one finds that the death-rate per 1,000 is higher:

1873 to 1882	...	...	...	2.57
1883 to 1892	...	...	...	2.01
1893 to 1902	...	...	...	1.52
1903 to 1912	...	...	...	1.46

When one compares the death-rate from accidents per 1,000 persons employed in the principal mining countries in Europe—France, Prussia, Belgium, and Great Britain—and after remembering that 1906 was an abnormal year in France owing to the Courrières disaster, the figures show that death from accidents in mines in France is less than it is in both Prussia and Great Britain, and the figures for Prussia seem to be extraordinarily high as compared with those of the three other countries.

Further, during the past thirty years there has been a great improvement in the death-rate from accidents per million tons of mineral obtained, the figures being as follows:

	Average Death-rate per Million Tons.
1873 to 1882	7.42
1883 to 1892	5.65
1893 to 1902	4.7
1903 to 1912	4.76

This table shows very little improvement in the last ten years, but this apparent state of things is due to the fact that in 1905, 1909, and 1910 there were explosions of either

fire-damp or coal dust which caused death to over 100 people, and as a result the figures for the last ten years have been materially swollen.

NON-FATAL ACCIDENTS.

The official statistics do not show the number of non-fatal accidents which occurred each year prior to 1908, but in the years from 1908 to 1912 no less than 771,500 work-people were injured in the mines to such an extent that they were incapacitated from work for more than one week, and in the year 1911 the figures rose for that year alone to 166,616.

For every million tons of coal that is brought from the mine to the surface, between four and five persons are killed and more than 550 are injured, and, speaking generally, 17 per cent. of underground workers are injured every year in the pursuit of their employment.

The number of accidents, both fatal and non-fatal, for the year 1912 shows a reduction in all the coal districts in England, and this is due to the fact that during the coal strike the majority of the pits in the country were closed for six weeks.

CAUSES OF ACCIDENTS.

The chief source of both fatal and non-fatal accidents in mines is due to falls of ground, that is to say, falls of the roof or sides in the working places or roadways of the mines. One can say that for many years fatal accidents due to this cause constitute nearly one-half of the total number of fatal accidents which take place underground. The same thing may be said of the non-fatal accidents which occur in mines.

Next to falls of ground, haulage accidents of various kinds and shaft accidents occupy the most important position, and the number of deaths and injuries produced by explosions of fire-damp or coal dust is comparatively small in number.

Among other causes of accidents, one must mention those produced by explosives, eruptions of water, electricity, machinery, and underground fires, as well as those which occur on the surface.

THE NATURE AND SEVERITY OF NON-FATAL ACCIDENTS.

It has been found that in addition to 1,200 or 1,300 men being killed in the mines of this country each year, more than 160,000 each year are injured by accidents which are not fatal. From the information gained by statistics drawn up by the Home Office in connexion with the Workmen's Compensation Act, we learn that a greater number of persons are disabled for two to four weeks than for any other stated period. In 1910, 80,000 persons were disabled for this period of time, and in 1911, 86,000 were so disabled. Roughly speaking, 50,000 miners are injured every year in such a way as to incapacitate them for work for between one month and three months. The number of injuries which cause incapacity between one week and two weeks is extremely small, being about 8 per cent. of the total; but almost as important as the yearly death-roll is the number of miners who are incapacitated each year, and who have not recovered at the end of one year. This number amounts to something like 12,000 a year. This large number does not only represent so many broken bones or lost limbs, but it includes many diseased conditions, directly set up as a result of the injury they have sustained, and medical men who work in colliery districts have almost daily experience of the effect of trauma as a causation of disease or the aggravation of some pathological condition which had previously existed. I feel that we are only beginning to understand to what extent trauma does influence disease, and in the mining districts we have a great mass of material upon which observations can be made in this direction.

INJURY AND DISEASE.

In concluding the lecture, I wish to speak of the subject of disease set up or aggravated by accident, with special reference to the influence of injury upon tuberculosis, not only because of the many thousands of people who are affected with this disease, but also because of the far-reaching effects of injury upon the onset and course of this disease. Briefly, one may say that tuberculous arthritis may be set up as a result, or certainly be aggravated as a result, of an injury to a joint; a crushed chest may be regarded as the beginning of tuberculous pleurisy or phthisis; or an injury such as a strain, apart from more

violent injuries, may aggravate a tuberculous condition of the lungs, so as to even result in a fatal issue; and in cases where tuberculous meningitis has followed a blow on the head, or where tuberculous peritonitis has dated back to an injury of the abdomen, one can reasonably infer that there is some direct connexion between the original injury and the subsequent pathological condition. In the same way, periostitis, nephritis, cystitis of a tuberculous nature, may in certain cases be said to result from an injury to the region of the diseased part; and undoubtedly trauma may play a prominent part in the etiology of Pott's disease of the spine. We thus see what an important part injury plays in the onset and course of tuberculosis, and the same may be said of many other diseases.

The sedentary life imposed on a miner by an accident might produce, in those who have previously led vigorous lives, fatty degeneration of the muscles and even of the heart; gout and rheumatism may be set up as a result of the same cause, and it is common experience among medical men who practise in a mining district to find that enforced sedentary habits among miners frequently lead to indigestion, constipation, and haemorrhoids.

NERVOUS DISEASES.

I feel I cannot leave this subject without referring to the various nervous diseases which may result from accident or injury. The influence of injury upon diseases of the nervous system has been more fully considered than that on any other part of the human body. Pearce Bailey has written an exhaustive work upon this subject, and he gives us not only the benefit of his own experience, but he examines all the literature upon this important subject, and he comes to the conclusion that trauma has a decided influence upon the causation of many well-known recognized nervous conditions, such as neuralgia, neuritis, locomotor ataxy, paraplegia, disseminated sclerosis, paralysis agitans, epilepsy, insanity, and the functional conditions which we know as hysteria and neurasthenia.

The commonest nervous sequela of all kinds of injuries among miners is neurasthenia. I do not suppose that there is any class of men so liable to this condition as colliers, and I attribute this frequency to the dangerous nature of the collier's work and to the influence of heredity. There is no industry where heredity plays such an important part as in the mining industry. Officials and workmen alike are sons and grandsons of those who have worked in the pits before them. The risks to which the miner is subject must have some effect upon his nervous system, and his appearance going to work shows a marked difference from the appearance of workmen engaged in other industries. Pottery employees are found early in the morning whistling and laughing as they go to work, but my experience of colliers is that their facial expression indicates mental sadness, although the collier would probably deny that that was so. As far as I can judge, a miner's frame of mind on going to work is one of unconscious apprehension, and the effect of this mental condition from one year to another, and from one generation to another, has an important influence, in my opinion, upon the etiology of neurasthenia in this class of men.

WANT OF PROPER TREATMENT.

The nature of the work and heredity are the two predisposing causes. The exciting cause is some injury, generally an injury to the back, of a comparatively trivial character, and I believe that the neurasthenia in many cases is a direct result of want of proper treatment in the early stages of the injury. As a rule, a miner who sustains a sprained back is treated with some local application, either of the nature of plaster or liniment; he is under the treatment of either his club or panel doctor, or he may attend very occasionally the out-patient department of a local hospital. But, apart from this, he has no treatment, and he simply loaf about with a stiff and painful back, and soon develops a neurasthenic condition. If these patients were treated at the very onset with massage and movements, their incapacity for work would be extremely short in the vast majority of cases, and the men would return to work without having contracted any functional nervous symptoms. Want of treatment is most disastrous to the man, to his family, and to his employer,

because when neurasthenia is definitely set up in these cases the treatment which would deal satisfactorily with his condition is not at the man's disposal. In these cases only Weir Mitchell treatment is of any avail, yet how seldom can a miner working in mining districts, remote from great hospital centres, have the advantage of what is the only treatment which will result in an efficient cure!

I have seen so many of these neurasthenic cases in North Staffordshire that I feel convinced that malingering plays practically no part in this class of case, and it should not be forgotten that one attack of neurasthenia, even if the condition improves to such an extent that the man is able to resume some form of employment, may predispose to another attack, even after a slight injury, and on one occasion I saw a coal-miner with typical symptoms who had met with no injury at all; he had been working with another man as his companion in a new cutting when the roof fell in and injured his fellow-worker, and the uninjured man was so upset at this occurrence that he became very nervous, and within a few days he presented characteristic symptoms of neurasthenia.

THE PATHOLOGICAL CHANGES OF THE THYROID IN DISEASE.*

BY

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In a paper on hyperthyroidism¹ (published in this JOURNAL last November) it was shown that the pathological changes of exophthalmic goitre could only to a certain extent be reproduced by thyroid feeding in cats, rabbits, guinea-pigs, and dormice, and, as was to be expected, hyperplasia of the thyroid was one of the changes that could not be reproduced. In another paper² it was demonstrated that a hyperplasia of the thyroid microscopically similar to that of exophthalmic goitre was to be found in diseases such as infantile diarrhoea, measles, diphtheria, and whooping-cough, and that it could be artificially induced in guinea-pigs by the injection of diphtheria toxin. Hale White³ first pointed out that if a large series of thyroids were examined they would be found to vary greatly. This was confirmed by Simpson,⁴ who described thyroid changes in certain acute diseases, and by Marine and Lenhart, who examined a series of 73 from various conditions. No attempt has yet been made to separate the diseases according to their action on the thyroid.

The object of this paper is to point out those diseases and toxæmias that do and those that do not produce an alteration in the thyroid, to describe the pathological changes in the gland, to demonstrate them by a series of illustrations, to compare them with those seen in goitre, and to note when these changes are associated with signs of thyroid excess.

The work is based on some 700 thyroids collected from *post-mortem* examinations during the last five years, but, as I have been unable to procure them from man in certain of the rarer diseases, recourse has been had to guinea-pigs and inoculation, though it is hoped that in time these may be confirmed by specimens obtained from man. There is no wish to be dogmatic from the appearance of single sections; doubtful cases have been as far as possible eliminated.

It is proposed to take the micro-organisms in alphabetical order.

BACILLI.

Bacillus aerogenes capsulatus.

The thyroids were taken from 2 cases of spreading traumatic gangrene, the one thirty-six hours, and the other four days, after infection. Pure cultures of the bacillus were grown in the first case; the thyroid showed no change. In the second case other micro-organisms were present, and the thyroid presented a complete hyperplasia with total colloid absorption.

Bacillus anthracis.

Five guinea-pigs were inoculated with anthrax and the thyroids obtained after death. Sections showed total

colloid absorption, cell hyperplasia, and some intervesicular haemorrhage. The change took place within two days.

Bacillus coli communis.

Three guinea-pigs received intraperitoneal injections of *Bacillus coli communis*. An illustration represented the thyroid of one of them that died after two inoculations, one on the sixteenth day and the other twenty-four hours before death; it showed total colloid absorption, marked cell hyperplasia and intervesicular haemorrhage.

Coliform Bacillus.

Cultures of this organism were grown from the faeces of a patient affected with endemic goitre. It is the organism that has been described by Major McCarrison⁵ as the one that produces endemic goitre in the Gilgit Valley; its characteristics are that it merely decolorizes sucrose-litmus and produces no indol. Emulsions from a culture were injected into the peritoneal cavity of three guinea-pigs; they each received two injections to give them a coliform septicaemia. The effect on the thyroid was to produce total colloid absorption and cell hyperplasia.

Bacillus diphtheriae.

The thyroids have been collected from 8 cases of diphtheria; they show an active hyperplasia, and will be described in full later.

Bacillus of Dysentery.

Three guinea-pigs were inoculated with emulsions of Flexner's bacillus and three with Shiga's bacillus. They both showed total colloid absorption with intervesicular haemorrhage; cell hyperplasia was rather more marked from the injection of Shiga's bacillus. Fig. 1 represents the thyroid from one that received two injections of Shiga's bacillus on the eleventh day and twenty-four hours before death.

Asylum Dysentery.

The glands were taken from 9 cases of asylum dysentery, and no change was observed in 3 cases before the fifth day; on the fifth day and on the sixth colloid absorption with commencing hyperplasia was present; at the end of a month complete hyperplasia had taken place, but at the end of several months the glands were found to have reverted to the colloid state.

Gaertner's Bacillus.

The thyroids were taken from 12 cases of infantile diarrhoea; an active hyperplasia was found, the degree of which varied with the duration of the disease.

Bacillus mallei.

Three guinea-pigs were inoculated with glanders. Fig. 2 represents the thyroids of one that died in twenty-four hours. It shows total colloid absorption, extreme cell hyperplasia and intervesicular haemorrhage. The change produced in this short space of time is quite remarkable.

Bacillus of Tetanus.

Three guinea-pigs were inoculated with an emulsion of the tetanus bacillus. A coloured photomicrograph of the thyroid of one that died five days after the inoculation served as a good example of the acute haemorrhagic change, though the degree of cell hyperplasia was not so marked as in some other toxæmias. This appearance is borne out by the appearance of a child's thyroid taken twelve days after an injury and four days after the commencement of tetanic convulsions.

Tubercle Bacillus.

The changes of the thyroid in tuberculosis have been gauged from 48 cases. They vary according to the type of infection. The acute miliary form produces a complete thyroid hyperplasia, the chronic a colloid hyperplasia. These reactions will be fully described later.

Bacillus typhosus.

The thyroids have been obtained from 2 cases of typhoid fever, four weeks and nine weeks respectively after infection; practically no change was found. In the specimen of four weeks' duration there was a slight chronic hyperplasia, with some excess of colloid, all but negligible.

COCCI.

Gonococcus.

No thyroid has been obtained from any case of gonococcal septicaemia, but two have been taken, one from a case of gonorrhoea that died as the result of an injury, the other from a case that died from lobar

* Read before the Pathological Section of the Royal Society of Medicine.