

Th. Sect.

THESIS ON
CONJUGAL TUBERCULOSIS

Presented by

STEPHEN ROWLAND, M.B., C.M., Edin. D.P.H. Camb.

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I. INTRODUCTION.

The subject of conjugal tuberculosis has received much attention from medical writers during the past fifty years, having engaged the attention of workers amongst tuberculosis in all civilized countries. The results of these observers show a great lack of unanimity as to the frequency of this condition, its modes of development i.e. the manner of infection, and the morbidity of the disease in the two partners.

The generally accepted opinion has been that conjugal infection seldom occurs, but recently Dr. E. Ward has published the results of his investigations which seem to show it is by no means uncommon. If we accept the inhalation method of infection as the only one which takes place in Phthisis, one would expect, considering the intimate relations of a married couple (where they are for more than eight hours out of the twenty-four, under ideal conditions for infecting each other) transmission of the disease from one partner to the other would be relatively a common occurrence. It would appear to a casual observer that it must be merely a matter of time before one partner infects the other, where



one is an open case of Phthisis i.e. where one is excreting T.B. in the sputum, as practically all Phthisis cases do before the end. Any case in which T.B. cannot be found in spite of marked physical signs in the chest, should be looked upon with suspicion, and with a view to reconsidering the diagnosis.

The writer is convinced that many cases of what Dr. Clive Rivière¹ so aptly labels "damaged lung" have been in the past, and still are looked upon and treated as Phthisis. Nevertheless in spite of the conditions for the transmission of infection being ideal that transmission very seldom occurs, and Fishberg² after a careful study of the subject goes so far as to say it never takes place. He examined 9 women and 161 men. In the latter group he found that 78 of the wives lived with their tubercular husbands at home, and of these 51 slept in the same room and 23 in the same beds. Of the rest 27 of the tuberculous husbands were inmates of a sanatorium or hospital for consumption and five were away from home though not in institutions. Out of this number there was only 3 per cent of cases where husband and wife were tuberculous. A very strong argument against conjugal infection.

On the other hand Sir Hermann Weber³ found in 68 persons male and female who, with more or less

pronounced consumptive taint, had married healthy partners, that ten of the partners of these 68 cases became consumptive or 14.7 per cent. Nine of the tuberculous husbands lost eighteen wives viz. one lost four, one three, four lost two each and three one each.

Dr. Edward Ward⁴ in the Lancet October 4th 1919 gives the results of his examination of husbands and wives of tuberculous patients, and out of a total of 156 examined (120 wives and 36 husbands) he found 91 to be tuberculous, the astonishing figure of 58 per cent. The above differences are rather difficult to explain - Possibly in some few cases there is a slow infection of the healthy spouse by the tuberculous one, and a condition of resistance is reached as a result of this slow inoculation similar to immunity developed as a result of auto-inoculation. In the cases where infection was transmitted from one to the other it may be that a massive dose of the infective material was instrumental in producing infection before the resisting mechanism had got to work i.e. before any degree of immunity had been developed.

In a couple who have been married some time where one or the other develops Phthisis the partner may be infected but slowly, and therefore immunity may

develop. The consumptive who infected three successive wives may be supposed to have been discharging large numbers of T.B. in the sputum and the healthy wives became infected with massive doses and succumbed before immunity could be developed. Or to follow this case a little further, he may have been excreting a particular strain of bacillus which was very virulent to contacts but to which he himself was to a large extent immune owing to the effects of autoinoculation. While touching on this possibility the writer would mention that he has not altogether given up the idea of the beaded and degenerate forms of the Tubercle bacillus being less virulent than the shorter, thicker non-beaded type. Again it may have been a coincidence that this man excreting large numbers of T.B. chose as partners women whose natural immunity to this disease was of a very low order, it being assumed that everybody possesses that property to some degree.

As far as the writer can ascertain the greater part of the work on Conjugal tuberculosis has been carried out with regard to "infection" rather than with regard to "death" of the partner. It is his opinion this is not the most satisfactory method of attacking the problem as it leaves too much to the personal equation of the observer. What one

clinician may consider a case of early infection may be rejected by another as not showing sufficient symptoms or physical signs to warrant a diagnosis of Pulmonary Tuberculosis. The experience of the last few years has brought this point into prominence not only in this country but also in France and America. It is the writer's opinion the most accurate information regarding the amount of Phthisis amongst both the married and single is to be obtained from death certificates, for in the closing phases of the disease the chance of error in diagnosis is reduced to a minimum, and for the preparation of this thesis death certificates alone have been used. He has investigated the 1242 deaths from Phthisis which occurred in the borough of Northampton during the ten year period 1911-20 with a view to ascertaining the frequency of Conjugal Tuberculosis as compared with the findings of other observers i.e. the frequency of death from Phthisis of the spouse of a tuberculous person.

II. HISTORICAL OUTLINE.

Dr. Tillische⁵ of the Grefsen Sanatorium, Norway published in 1914 the result of his enquiries into the previous history of 841 patients with a view to

ascertaining in what per cent of them clinical tuberculosis had existed in childhood. He found evidence of it in 156 cases or 18.5 per cent. This figure agrees with the figure Dr. Harbitz arrived at during his work as a pathologist.

Dr. Sophie Tillische⁶ gave in "Tubercle" for March 1922 the result of her own investigations into the history of 3151 Sanatorium patients during the ten year period 1911-20, the period embraced by the writer's examination into the deaths which occurred in the borough of Northampton certified as being due to Pulmonary Tuberculosis. Amongst the 3151 patients examined by Dr. Tillische 1992 were unmarried persons and 1152 were married - Amongst these latter 1152 85 or 7.4 per cent were found whose consorts were also tuberculous, and the question arises was the disease in these cases conveyed from one partner to the other, or was there some other source of infection? Were these persons exposed to infection during childhood, and during that time did they show clinical signs of Tuberculosis?

In thirteen of these eighty-five cases these important questions are answered in the affirmative, therefore they are excluded as being too doubtful to include amongst those of undoubted conjugal origin.

There remained 72 cases in which "Tuberculosis can in all probability be assumed to have been conveyed from one partner to the other". Even in this group there are isolated cases not above suspicion, if one may use such a term i.e. with a history of tuberculosis in the inner family circle. Dr. Tullische assumes that one consort infected the other in 72 cases or 6.2 per cent of the total, and if these figures be accepted it shows that marriage with a consumptive does carry with it a certain amount of risk for the healthy partner, that risk being roughly speaking doubled. Amongst the 1152 married persons there were 94 widows and widowers. In 44 of these cases or in 47 per cent the consorts of these patients had died from tuberculosis.

Inquiries were made amongst the 3151 patients regarding the occurrence of tuberculosis in both parents. This was found in 70 cases or in 2.2 per cent.

It will be noted that these observations deal entirely with Sanatorium patients, and no mention is made as to the presence or absence of Tubercle bacilli in the sputum which the writer of this thesis considers a weak point in the evidence, it being common knowledge that large numbers of people are labelled tuberculosis and admitted to Sanatoria though not suffering from tuberculosis. Secondly

he is not inclined to lay much stress on the information gleaned as to the presence of tuberculosis in both parents. The information obtained from patients as to what happened almost a generation previously is usually very unreliable, and to be of any statistical value requires to be supported by written evidence.

Arnold Minning⁷ of Denver U.S.A. investigated 1000 successive dispensary cases with a view to obtaining some reliable data as to the extent of conjugal tuberculosis. He states he was specially careful to classify none as tuberculous, which were in the least doubtful, and from the physical signs present in the accepted cases it may be assumed that errors in diagnosis were few, though one may mention that every case of hæmoptysis or even repeated hæmoptysis is not necessarily one of tuberculosis. In Minning's series 502 patients were married and 498 single and amongst the 502 married active tuberculosis was found to be present in husband and wife in 44 cases or 8.7 per cent. Amongst the 44 cases twenty-two of the consorts died from tuberculosis i.e. 50 per cent. Of the twenty-two surviving consorts seventeen were men and five were women. In these twenty-two widowers or widows Tubercle bacilli were found to be present in the sputum of twelve.

The period of illness extended from four months to twenty years.

Commenting upon his findings Minning states they agree with those of most investigators and he summarizes his conclusions as follows.

1. He finds the incidence of marital tuberculosis to be 8.76 per cent, and when a consort dies the mate has been infected in 50 per cent of cases.
2. There is such a thing as adult infection, and we should constantly bear this in mind in our advice to the layman.
3. It is evident that when there is a continued massive infection over a period of years, and especially when the consort dies (in these last years patients are especially careless and slovenly) there is not only a possibility of contagion but in one out of every two cases active tuberculosis supervenes.
4. These investigations covered only dispensary cases. In private practice the incidence of marital infection is smaller, proving that intelligent prophylaxis is worth while.

Dr. Harry Lee Barnes⁸ of Wallum Lake, Rhode Island gives in the American Review of Tuberculosis No. 8 his experiences of 5608 consecutive cases of tuberculosis admitted to the Rhode Island State Sanatorium between Nov. 1, 1905 and May 5, 1921. There were 2262 married persons admitted and of these 62 or 2.7 per cent claimed to have partners suffering from pulmonary tuberculosis. Twelve of these 62 being cases of repeated admissions reduced the actual number of individuals to 50. Of the 50 married patients with tuberculous consorts 58 per cent had T.B. in the sputum, and the remainder had signs and symptoms which were considered to be diagnostic. Eight of the fifty patients had consorts who were in the institution, but in the other forty-two cases the patients' statements that their partners were tuberculous were not verified by the institution. That 2.7 per cent of all tuberculous married persons should have tuberculous consorts is not surprising as 2.7 per cent is the generally accepted figure for clinical tuberculosis of the whole population.

Barnes rightly states that statistics based on patients who have had consorts die from tuberculosis are more valuable not only because plenty of time may elapse for the development of the disease, but also because death is something definite. Patients

statements that their consorts died from Consumption, like the physicians' certificates on which they are usually based, are subject to occasional error, yet they probably minimise rather than exaggerate the number of cases of tuberculosis.

Of the 5608 admissions 229 different individuals had been widowed. The records show 100 different persons whose consorts died from tuberculosis, but seven of these had remarried and were classified as married reducing the number to 93, which gives a figure of 40 per cent of all widowed tuberculous persons who lost their consorts from tuberculosis. Of the 100 dead consorts 57 were husbands and 43 wives. Of the 100 widowed tuberculous patients whose consorts were said to have died from tuberculosis 71 had positive sputum and 29 negative though all the latter showed signs which were held to be diagnostic of tuberculosis.

Barnes draws two conclusions from his investigations:-

1. The histories of 229 consecutive widowed patients admitted show that 40 per cent lost their consorts from tuberculosis, a tuberculosis mortality over three times as great as that of the married people of the community.

2. Immunity from many diseases is short lived, and until much more convincing evidence of permanent immunity against tuberculosis conferred by infection during childhood is forthcoming, a cautious logic will not accept the confident statements that are being made as to the impossibility or rarity of adult infection.

The criticism one would make regarding Barnes' work is the apparent difference between the number of persons who alleged they had tuberculous consorts viz. 2.7 per cent, and the number of widowed whose spouses were said to have died from tuberculosis. The former whilst apparently unsupported by any confirmatory evidence is much nearer (in fact agrees with) the Northampton figure based on death certificates, than the figure 40 per cent based on what is usually more reliable information.

Burney Yeo⁹ collected records of 1055 cases of Consumption which came under his notice in hospital. Of this number 621 were males and 434 were females. Of the males 306 were married 297 were single and 18 were widowers. Of the 18 widowers only two or aboutt

11 per cent could state positively they had lost their wives by consumption. Of the 434 females 199 were married 206 were single and 29 were widows. Only five or 17 per cent were able to state positively that their husbands died from tuberculosis. In the writer's opinion these figures whilst interesting are not very reliable from a statistical point of view as they are only the statements of patients, and secondly they do not take into account other sources of infection, or tuberculosis in the inner family circle. If these could have been investigated doubtless many cases would have been rejected as being of very doubtful conjugal origin.

Among 159 couples in which one of the partners was tuberculous Brehmer¹⁰ found that in 19 cases or 12 per cent both suffered from the same disease. Brehmer was dealing with "infection" not with "death" and much depends upon what evidence he based his findings.

Haupt¹¹ on investigating 417 cases found twenty-two instances or 5.2 per cent in which both partners were affected by tuberculosis.

Here again it is a question of "infection" not of "death".

Cornet¹² found amongst 594 couples both partners were tuberculous in 23 per cent of the instances. The same criticism may be offered as in Haupt's cases.

Jacob and Pannwitz¹³ collected information ~~from~~ from a number of German Sanatoria and found Conjugal tuberculosis present in 8.57 per cent of the cases.

Weinberg¹⁴ found amongst 1426 husbands of tuberculous wives that 118 or 8.3 per cent died from tuberculosis, and amongst 2506 wives of tuberculous husbands 112 or 4.5 per cent succumbed to the disease, or amongst 3932 consorts of tuberculous persons 230 or 5.9 per cent died from tuberculosis. He finds the mortality from Phthisis amongst those married to consumptives is about double that observed in the general population. It will be noted that Weinberg's observations embrace a large number of cases and deal with death not merely with infection.

Ludwig Levi¹⁵ investigated 317 married couples who lived in poverty and want; thirty-four shared the same bed. This group is one in which marital infection might be expected to reach its maximum but he only found $2\frac{3}{8}$ of the disease was due to marital infection.

Another study embracing 4100 cases was made by Crouch¹⁶ of the Modern Woodmen Sanatorium, Colorado Springs U.S.A. The 4100 patients were all males and of this number 2771 were married and 233 were widowed. Out of these 3004 cases of married and widowed 193 or 6.4 per cent had wives who either showed a history of tuberculosis, or who died from it. When he took the widowers he found that 136 or 58.37 per cent lost their wives from tuberculosis. He concludes that 58.37 per cent of tuberculosis amongst 233 widowers is more than a coincidence.

The writer of this thesis agrees that such a figure, if a correct one, points to more than a coincidence, but he would like to see the patients' statements supported by death certificates before accepting them. This evidence appears to be lacking.

Dr. Paul Roussel¹⁷ assistant physician to the Sanatorium des Pins and the Villemin Dispensary at Nancy has recently published a memoir on the subject.

At the dispensary he found both husband and wife were tuberculous in 11.6 per cent of 423 families investigated, and 25 per cent of tubercle amongst the children of these families. These figures led him to conclude that in 11.6 per cent of open pulmonary tuberculosis marital infection had occurred and

37.5 per cent of the children were affected. If ALL cases were included the percentage of conjugal infection dropped to 5.2 per cent and the infection rate for the children to 25 per cent. Dr. Roussel also makes the interesting observation that as a rule conjugal infection is milder than other infections, especially those of children, the difference being explained by a surinfection in one case and a primoinfection in the other. An infection frequently repeated at short intervals seems to be the most dangerous.

This observer had in all probability an excellent opportunity of studying the subject. The conjugal infection rate of 5.2 per cent does not seem a very high one when compared with 58 per cent of other investigators.

The danger of repeated infections at short intervals is what one would expect. The dose is repeated before the protective mechanism is properly established i.e. during the negative phase, when, for a time immunity is actually lowered.

One of the most recent and also one of the most interesting communications on the frequency of conjugal tuberculosis was published by Dr. E. Ward¹⁸ Tuberculosis Officer for S. Devon in the Lancet of Oct. 4th 1919.

After examining a large number of contacts Dr. Ward finds himself in marked disagreement with the generally accepted view that conjugal infection rarely if ever occurs, and his figures are of such a nature as to rule out the theory of assortive mating; or mere coincidence. He believes the important factor in the spread of tuberculosis is direct infection not predisposition. In other words it is the sowing of the seed, not its falling upon suitable ground which leads to fresh cases of the disease i.e. to its spread.

Out of 156 cases in which the mate of a tuberculous husband or wife was examined 91 were found to be tuberculous 16 were suspect and 49 negative which expressed in per centages give 58 per cent as tuberculous 10 per cent suspicious and 32 per cent negative. If the observations be confined to wives only whose husbands have been notified; he found out of 120 examined 66 were tuberculous 12 doubtful and 42 negative which again expressed in percentages gives 55 per cent tuberculous 10 per cent doubtful and 35 per cent negative. When husbands were examined whose wives were tubercular he found 25 tubercular out of 36 examined, 4 suspect and 7 negative, or 69 per cent, 11 per cent and 20 per cent. These figures are more readily interpreted if shown in tabular form.

	Number examined	Tub.	Suspect	Negative	Percentages		
					Tub.	Suspect	Negative.
Husbands. Wives first notified.	120	66	12	42	55	10	35
Wives Husbands first notified.	36	25	4	7	69	11	20
	156	91	16	49.	58	10	32

In discussing the results of his investigations Dr. Ward does not think assortive or selective mating plays much if any part in the problem as he does not find amongst the working class any marked tendency for a man or woman of a tuberculous type to choose a partner of the same type. It is Dr. Ward's opinion that the majority of the spouses of tuberculous husbands and wives sooner or later show signs or symptoms of tuberculosis. He makes a further interesting and far reaching statement in which he says that not only do they develop consumption, but the great majority recover, and make a speedier recovery than do tuberculous patients whose disease is not due to Conjugal origin. This he thinks may be owing to an acquired immunity due to repeated infections by graduated doses of bacilli. He thinks the subject of conjugal or marital infection should be reconsidered in

the light of recent findings as upon a correct view of the subject, involving as it does the whole question of childhood or adult infection, depends the success of the present and future campaigns against tuberculosis.

Arent De Besche¹⁹ and Jorgen Jorgensen have recently investigated this subject using the statistical material of the City Board of Health of Kristiania. Their findings are summarised as follows.

The question of immunity against tuberculosis in adults acquired through infection during childhood is still under lively discussion. The malignity of tuberculosis amongst the primitive races seems to advocate such a reason for immunity, as does also the experiences of the distribution of tuberculosis between married couples where one of the mates has been infected. The authors have taken up this side of the question using the statistical material of the tuberculosis department of the city board of health of Kristiania where tuberculosis is very prevalent, and where post-mortem examinations and Von Pirquet's tests have proved that nearly every person has been infected before reaching adult age. The individuals here concerned have all been carefully examined and kept under observation for

years. In 742 married couples where one of the mates was suffering from open infectious tuberculosis of the lungs, and had been thus reported to the Board of Health (notification being compulsory in Norway) there were found 39 cases or 5.35 per cent where the other mate also suffered from tuberculosis. Of these 39 persons thirty-three had contracted the disease after marriage (4.45 per cent) and reliable information was collected regarding 32 of these 33 persons. It was found that 16 had lived during their youth in tuberculous surroundings and six of this group had even shown tuberculous symptoms. Other sixteen had lived in healthy surroundings but 5 of this group had during childhood suffered from swollen glands, or before marriage from a catarrhal condition of the apices of the lungs or from pleurisy.

Consequently 11 cases (1.48 per cent) remain where it may be assumed that life in wedlock with a person suffering from infectious tuberculosis had been the prime factor in the development of their own tuberculosis.

The authors conclude that a slight tuberculous infection during childhood very probably offers a considerable protection against tuberculosis in later life; the immunity thus acquired being however only relative so that exogen infection during adult life will always be of some importance in the etiology of

tuberculosis. There is some risk connected with life in wedlock with an individual suffering from open infectious pulmonary tuberculosis.

The late Ernest G. Pope²⁰ of the Adirondak Cottage Sanatorium, Sarnak Lake N.Y. was at the time of his death engaged on the problem of Conjugal tuberculosis. The work has been completed and edited by Dr. Karl Pearson.

The author has attempted to analyse mathematically the incidence of conjugal tuberculosis. He points out the difficulties of the problem.

1. It is conceivable that the resemblance in phthisical character between husband and wife may be wholly or in part due to the tendency of like to mate with like, and not all or not wholly due to post marital infection. From an analysis of reported cases it is difficult to reach a definite demonstration of the existence of marital infection, unless the assumption is made that the tubercular diathesis is an inherited character. If this is admitted marital infection may have a definite but not influential effect.

There are no investigations or observations extant which fulfil the conditions necessary for obtaining a definite solution of the problem.

Pope attacked the problem with the aid of modern statistical methods. Thus, if 1000 married couples are taken and one person in ten dies from tuberculosis, amongst the 1000 husbands we should expect 100 to die from tuberculosis and 900 from other causes.

Amongst the wives of 100 tuberculous men we should expect to find one in every ten i.e. 10 die from tuberculosis and 90 from other causes. Amongst the 900 non-tuberculous men we should have 90 tuberculous and 810 non-tuberculous deaths. Summarising we should expect the 100 couples to die as under:

H + W + 10	H + = Husband tuberculous
H + W - 90	H - = " non tuberculous
H - W + 90	W + = Wife tuberculous
H - " - 810	W - = Wife non tuberculous.

Of course there would always be variations from these exact numbers but the limits of such variation can be calculated.

If instead of the above we found:

(20	or	(10
(80		(85
(80		(85
(820		(820

we note that something has disturbed the random or chance distribution of the disease and where the differences are greater than can be accounted for

by random sampling we are forced to the conclusion that marital relationship is the cause of the disturbance.

As a result of investigation by modern statistical methods Mr Pope arrived at the following conclusions.

1. It is possible that there is some sensible but slight infection between married couples.
2. That this is largely obscured or forestalled by infection from outside sources.
3. That liability to the infection depends upon the presence of the necessary diathesis.
4. That assortive mating probably accounts for at least $2/3$ and infective action for not more than $1/3$ of the whole correlation observed in these cases.

PART III. ETIOLOGY AND PATHOGENESIS.

When one considers the apparent facility for infection of the sound partner where the other is suffering from open Phthisis the most remarkable feature of the problem is the number who escape, or

at least do not die from the disease. It may be taken for granted that Phthisis is infectious, and whether a mixed infection plays a large or small part in bringing about the fatal end, there is no doubt that the Tubercle bacillus is the causative organism and it is by repeated doses of this organism that the disease is produced. Cases differ very widely as to the stage in which the T.B. is excreted in the sputum. In some cases it can be found while the physical signs in the chest are so slight as to be scarcely detected. The writer remembers a case of a man sent to the dispensary for diagnosis in which the physical signs were practically absent, hence his being sent for an opinion. The man stated he occasionally coughed up a small piece of hard material. He was asked to bring one of these pieces next time he obtained one. Within a week he brought a piece of sputum no larger than a split pea which was found to be almost a pure culture of the Tubercle bacillus. The patient was sent to a sanatorium where the medical superintendent noted the absence of physical signs. Other cases show very marked physical signs before T.B. can be found.

It is familiar to all who have seen a case of Phthisis that cough is in most cases a prominent feature of the disease, and it is chiefly by means

of the cough that the source of infection is spread around the patient, the more violent the cough the more widely is the infection scattered by the droplets of saliva and sputum thrown into the air with paroxysm of coughing especially as so few patients take the precaution of shielding the mouth with a handkerchief &c. When we remember that the sound partner passes a large part of the day and often the whole night in close proximity to the sick one, it is difficult to see how he or she escapes.

That some do not escape is shown by the figures quoted in the preceding section of this paper, but the writer is convinced the risk of infection is slight even in those cases in which practically no precautions are taken to guard against it. The explanation is that by the time men and women have reached the marriageable age they have passed the age of greatest susceptibility, which the writer believes is during childhood. In no other way can he account for the few deaths of the partners of tuberculous persons where so many factors which would lower resistance and favour the onset are present, especially amongst the working class e.g. anxiety, want of rest and frequently want of food. Just as childhood is the age in which mankind suffers most from Measles, Scarlet Fever, Diphtheria and Mumps (diseases grouped together as the common diseases of

childhood) so is it the age in which they become infected by Tuberculosis, but in this case the latent period is longer than in any other. The germ lies dormant or is finally killed off (the exact means by which this ^{is} effected being somewhat uncertain) unless it be awakened into activity by some condition which lowers the natural immunity of the subject. In text books on Infectious diseases we find the disease with the longest incubation period is given as Mumps, but the writer thinks this will in time be displaced by Tuberculosis. It may not be out of place to mention that in spite of infection taking place during childhood it is rare to find a child dying from Phthisis though every year many are notified as suffering from it. When these are traced and followed up year after year we fail to find any confirmation of the diagnosis. It is not, as a rule, until early or later adult life (the most active and useful period) that the disease manifests itself.

While some workers, Roussel and Ward, believe the most important factor in the production of marital infection is the sowing of the seed, Pope finds that $\frac{2}{3}$ of the infection is due to the seed falling upon a suitable soil i.e. to the tubercular diathesis. That there is such a predisposition or diathesis is apparent from the number of persons of the same families included in the 1242 deaths investigated by the

writer, viz:-

Brothers in	33 instances.	Three families each lost three brothers.
Sisters "	22 "	Four families each lost three sisters.
Father & Son	13 "	Including one Father and two sons.
Father & daughter	14 "	Includes three in- stances of F and two daughters and F. S. and 3 daughters.
Mother & Son	7 "	In one instance mother, son his wife and child.
Mother & daughter	8 "	
Brother & Sister	30 "	

PART IV. CLINICAL FEATURES, AND NOTES ON CASES.

When we come to consider the figures for the Borough of Northampton we find that 1242 deaths from Phthisis were certified by medical practitioners during the ten year period 1911-20 and when we examine the marital state of these 1242 persons we find them divided as follows - married 525, single 562, widowed 49, state unknown 106. Amongst this number we only find fifteen instances where both partners have been certified as having died from Phthisis within the decennium under consideration, and from these fifteen it is necessary to reject one couple owing to a history

of tuberculosis in the inner family circle rendering the source of infection too doubtful to be included amongst the cases of genuine marital infection. The following is a short summary of the fifteen cases including the rejects. The age given in each instance is that at time of notification.

1. 1911/133 T.D. husband age 32, notified 11.10.1911 Died 1.1.15.
1915/235 A.D. wife " 36 " 3.11.1915 " 14.11.18.

There is no family history of tuberculosis on either side. The widow was forced by circumstances to go out to work after the death of her husband, which may have reduced her immunity and favoured the onset of the disease. In the absence of any other known source of infection this may be looked upon as a case of conjugal infection.

2. 1907/6 H.M. 1st husband, age 27 notified 16.1.07. D. 15. 2.08.
1910/69 A.H. wife " 29 " 5.6.10. 11.10.12.
1911/63 H.H. 2nd husband " 30 " 13.5.11. 15. 6.18.

This woman lost two husbands from Phthisis but she did not infect her second husband, nor did both husbands infect her. We see her first husband was notified in January 1907 and died in February 1908. The widow was notified in 1910 and remained a widow until August 1912 when she married a man who had been sent home from the army in Malta on account of Phthisis as far back as May 1910. The woman was in an advanced state of Phthisis when they married. Here we possibly have a case of

conjugal infection in the first marriage and one of assortive mating in the second.

3. 1911/73 J.B. wife aged 48 notified 31.5.1911. D. 30.5.1911.
1915/165 C.B. husband 54 " 14.7.1915. D. 29.3.1916.

The wife was notified after death. Both wife and husband were beyond the usual age for Phthisis. In this case the wife apparently infected the husband, for though his family have a tubercular history it is not of such a nature as to exclude the possibility of conjugal infection. This couple lost a son from Phthisis in 1916 and a daughter also from Phthisis in 1918, both being upgrown.

4. 1911/2 T.W. husband age 41 notified 7.1. 1911. D. 17.1.1911.
1912/186 M.W. wife " 40 " 14.10.1912. D. 12.2.1913.

The duration of the husband's illness at notification was given as eighteen months, that of the wife as less than six months, and as death occurred a few months later in both cases, the period of illness was below the average for this disease. The history shows the husband commenced with Pneumonia, the wife with Pleurisy. A child of this couple died from Phthisis in 1914. With no history of other source of infection this may be accepted as one of conjugal infection.

5. 1911/168 F.T. wife age 26 notified 25.11. 1911. D. 28.11.1913.
1915/176 A.T. husband " 34 " 31. 7.1915. D. 10. 1.1917.

The wife who lost two sisters from Phthisis 1909/17 and 1911/167 probably infected the husband who had no family history of Tuberculosis.

6. 1912/19 C.J. wife age 38 notified 3.2.12. D. 20. 8.12.
1916/12 D.W.J. husband " 39 " 19.1.16. D. 22.10.17.

The wife's sister and brother died from Phthisis three years before she was notified. There was no family history of tuberculosis on the husband's side, we may therefore assume the wife infected the husband.

7. 1912/113 J.R. husband age 56, notified 28.5.12. D. 12 8.15.
1915/209 D.R. wife " 53 " 27.9.15. D. 15.12.15.

The husband was considered to be an advanced case of Phthisis in 1912. The duration of the wife's illness was given as six months at time of notification and death occurred within three months. In this case the husband evidently infected his wife. Both partners had reached an age when Phthisis is rare.

8. 1912/208 H.L. husband age 28 notified 27.11.1912. D. 25.1.1913.
1915/ 47 E.L. wife " 27 " 14. 3.1915. D. 19.4.1915.

As there is no family history of tuberculosis on the wife's side and the husband's brother died from Phthisis on 27.12.1913 we may infer the husband infected his wife.

9. 1913/308 L.C. wife age 24 notified 2.12.1913. D. 17. 2.1914
 1915/231 A.C. husband " 35 " 21.10.1915. " 4.12.1915

There is no family history of Tuberculosis on either side. The duration of the wife's illness at time of notification was given as three months, the husband's as twelve months. Here we must assume the wife infected her husband.

10. 1916/159 G.F.W. husband age 44 notified 17.8.16. D. 16.3.18.
 1917/174 C.W. wife " 36 " 6.6.17. " 10.1.18.

Here we find no history of tuberculosis on either side. Both cases were said to have commenced with Pneumonia. Though the husband was notified first he outlived his wife. He probably infected her.

11. 1914/205 C.S. wife age 40 notified 14.8.14. D. 22.10.1914.
 1915/149 E.S. husband " 49 " 2.6.15. " 21.7.1915.

The wife's sister was stated to have died from Phthisis but this could not be verified. The couple lost a son from Phthisis on 21.5.17, age 20 years. In the absence of any other known source of infection it may be assumed the wife infected the husband.

12. 1915/199 W.K. husband age 28 notified 8.9.15. D. 26.2.1916.
 1916/ 16 D.K. wife " 27 " 26.1.16. " 17.12. 1916.

There is here no history of tuberculosis in either family. The duration of the illness at notification was short in both cases. The husband had

been off work two months, the wife had been ill for seven. The husband probably infected his wife before the nature of the disease was suspected.

13. 1915/180 J.C. husband age 33 notified 7.8.1915. D. 9.4.1917.
 1916/ 82 E.C. wife " 30 " 4.5.1916. D. 27.3.1917.

There is no family history of tuberculosis on the husband's side. The wife was said to have always been delicate and to have lost a brother and a sister from Phthisis but here again the statement could not be verified. This is a rather doubtful case, but in the absence of definite evidence, and as the husband was notified first we may assume he infected his wife who had little power of resistance, i.e. whose immunity was of a low order.

14. 1915/ 67 M.B. wife age 49 notified 20.3.1915. D. 21.4.1918.
 1916/153 T.B. husband " 53 " 8.8.1916. " 31.3.1918.

There is no definite family history of tuberculosis on either side; we may assume the wife infected her husband. This couple lost a son from Phthisis in 1910 and another in 1912.

15. 1916/214 W.T. husband age 28 notified 1.11.1916. D. 25. 10.16.
 1916/233 A.T. wife " 24 ." 28.11.1916. " 225. 3.17.

This to outward appearances is a case of one partner infecting the other, but as the husband's

mother also the wife's mother died from Phthisis (the former as recently as 25.12.1923) we cannot accept it as a case of conjugal infection. Tuberculosis in the inner family circle on both sides excludes it.

It will be seen that out of the 1242 deaths from Phthisis in Northampton in ten years we can only find fourteen couples of whom it may be said that one partner probably infected the other. As the number of deaths of married persons was 525 the fourteen accepted cases give a figure of 2.7 per cent. There are several other instances where married couples have died from Phthisis; but one of the spouses has died outside the ten year period under consideration. If by extending the period under review these had been included we would, of course, have obtained a larger number but the total deaths from Phthisis would also have been greater, and I see no reason for believing the percentage figure for married couples would have been increased.

Others who have made a study of marital tuberculosis with the percentages of contagiousness they have found in their investigations are given herewith. Elasser 39 per cent. Gebser 5 per cent. Jousert 3 per cent. Thom 3 per cent. Arent de Besche and Jorgen Jorgensen 1.48 per cent. Turban 6 per cent. Ludwig Levy 2.8 per cent. Ward 58 per cent.

It will be noticed there is a marked difference in the findings of these investigators ranging from less than 1.5 per cent to the astonishing figure of 58 per cent., but it must be remembered some of these workers dealt only with infection, a very doubtful quantity varying with the personal equation of the observer, whilst the figures for Northampton deal solely with deaths where errors of diagnosis are surely reduced to a minimum. Now the figure 2.7 per cent for the amount of contagiousness amongst the married couples in Northampton varies little from the generally accepted figure for the clinical tuberculosis rate for the general population.

Amongst the 14 accepted cases the husband was notified first in eight instances, and in the remaining six the wife was notified before the husband. The average period between notification of the husband and wife when the husband was notified first was approximately twenty-five months, but when the wife was notified before the husband it was thirty-two months. The average period which elapsed between the deaths of the partners when the husband was notified first was twenty-one months; when the wife was notified before the husband it was about thirty-two months, but as the periods varied widely in the different cases these figures are not of much value.

V. SUMMARY AND CONCLUSIONS.

My investigations lead me to the following conclusions.

1. Conjugal tuberculosis is rare.
2. The death rate from Phthisis of the spouses of tuberculous persons varies little from that for the general population of the corresponding age.

The Phthisis D.R. for Northampton 1911-20 was 1.4.

For England & Wales during the same period it was 1.1.

3. Ideal conditions for infection exist, but infection rarely occurs owing to the age of greatest susceptibility having passed by the time the marriage age is reached.
4. My findings support the view that infection usually occurs during childhood, hence the advisability of protecting children whose parents are suffering from open Phthisis. Upon these lines the Gra~~ffer~~cher system is founded and is being worked successfully in France.

5. When Conjugal infection does occur the disease usually runs a relatively short course.

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