ORIGINAL COMMUNICATIONS.

FACTS AND OPINIONS RELATING TO TUBERCULOSIS, WITH COMMENTARIES.

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NO. V.

THE pathological appearances presented by the lungs in connexion with tubercle was the subject of my last paper. I now proceed to analyse the facts contained in the *Decennium Pathologicum* relating to the occurrence of

II. TUBERCLE IN ORGANS OTHER THAN THE LUNGS.

The frequency with which tubercle was met with, in the different organs and tissues, in the 2161 *post mortem* examinations after death, from all diseases, comprising 566 deaths with tubercle, has been given in Table xx. (ASSOCIATION JOURNAL, 1853, p. 1034.)

I had previously published a table showing "The Frequency of the Development of Tubercles in the various Organs and Parts of the Body, in 1136 Cases of Tuberculosis occurring at all Ages", collected from the works of Louis, Lombard, Boyd, Papaoaine, and Rilliet and Barthez. (*On Tuberculosis*, p. 359.)

A comparison of these tables indicates very considerable differences in the relative liability of the tissues and organs to the development of tubercle, according to the experience of different observers. In making the comparison of the aggregate numbers in the two tables, it is necessary to bear in mind that Dr. Chambers's table, being drawn from the records of a general hospital, includes but a small proportion of children, and scarcely any infants under two years of age; that it embraces a large proportion of cases in which tubercle was found, although death did not result from tuberculosis; and that it is an example of the statistics afforded by the disease in this country, and especially in this metropolis.

In both series, the lung is the organ in which tubercle is most frequently deposited. In the 566 cases—the greater number above fifteen years of age, and nearly all far beyond infancy—it was met with in 517, or 91.3 per cent.; and in the 1136 cases, including infants, in 1030, or 90 per cent. Among 489 infants and children, in the latter aggregate of cases, 403, or 82.4 per cent., and, among 647 adults, 627, or 96.9 per cent., had tubercle in the lungs. Thus, in a series of statistics representing the seat of tubercle, in 566 cases where tubercle existed, without reference to the cause of death, the morbid element was *absent* from the lungs in adults in a much larger proportion of cases than in a series where death was probably in nearly all the cases produced by tuberculosis. Moreover, this difference results, as appears in Table xix (ASSOCIATION JOURNAL, p. 1034), mainly from an excess of cases of tubercle in the kidneys independently of tubercle in the lungs.

The Intestinal Canal. After the lungs, the part most frequently affected with tubercular deposit and tuberculous ulceration is the intestinal canal; and this is found to be the case both in the 1136 cases in my own table, and in the 566 cases occurring in St. George's Hospital. It must not, however, be received as an absolute rule, applicable to all ages; for, in 489 children included in the 1136 cases, the morbid deposit occurred much more frequently in the bronchial glands than in the intestinal canal. In the St. George's Hospital table, the proportion of cases of intestinal disease is much smaller than in the aggregate table. In the 566 cases, there were 10 instances of tubercle, and 131 of "tubercular ulcers", in connexion with tubercle in the lungs; and, adding these numbers together, the ratios according to age were as follows:—

Under 16 years	27 per cent.
From 15 to 30 inclusive	33.6 "
From 30 to 45 inclusive	23.8 "
From 45 to 60 inclusive	18.1 "

Louis found, in adults, tubercular granulations in the small intestines in 54 out of 120 cases of phthisis, and ulcerations in *five-sixths* of the total number of cases; and, in the large intestines, tubercular granulations in 13 of 120 cases, and tuberculous ulceration nearly as frequently as in the small intestines. Rilliet and Barthez found tubercles and tubercular ulceration in 45 per cent. of children under 15 years of age. The aggregate in my table, out of 1136 cases, gives 447 in which the small intestines were affected. Dr. Boyd's statistics from the Marylebone Infirmary agree much more closely with those of St. George's Hospital than with those of the Parisian hospitals.

Dr. Chambers considers that there may have been omissions in examining the intestinal canal in some cases in St. George's Hospital—a circumstance tending to raise the percentage. We must take into account also the large proportion of those cases in which tubercle was met with in the organ in which it is first and most frequently developed (the lungs), but in which its progress was arrested by death resulting from accident and other diseases—a circumstance tending still further to raise the percentage. Dr. Chambers concludes that it is not necessary to suppose any "generic physical differences" to account for the difference in question.

Notwithstanding these allowances, I cannot help regarding the more recent statistics as confirmatory of an observation previously made, viz., that intestinal disease in tuberculosis is not so frequent in this country as in Paris and some other continental towns. The proportion in Dr. Boyd's cases was only about 18 per cent., both in adults and in children under 11 years of age. I believe also, from my own observation, that the occurrence or not of intestinal disease depends much upon the habitual diet of the individual, and much also upon the treatment of the intestinal symptoms so liable to occur from the earliest invasion of tuberculosis. Fournet found intestinal ulceration most frequently among the poorer classes, and especially those who had been insufficiently and badly fed. However the statistical question may be settled, every practitioner will bear us out, not only that the intestinal localisation hastens the progress of the disease, but that, as respects the inconveniences to the patient, and the pain produced, it is one of the most cruel of the complications, whether in children or adults. The acute pain produced by it, sometimes in the early, and often in the latest stages, when, but for such a complication, the passage to the grave would be comparatively smooth and easy, must alone constitute it an important object of treatment. There can be no doubt also as to its pernicious reaction upon the lungs, as remarked on by Dr. Chambers, and its tendency to aggravate the disease of the blood, thereby destroying all chance of the disease in the lungs being cured or arrested. I take the same view as Dr. Chambers of the practical conclusion to be drawn from these considerations. These statistical facts ought never to be lost sight of in the treatment of a case. In my own practice, I have always regarded intestinal symptoms, such as the slight griping pains, tenderness on pressure over circumscribed spots, constipation, diarrhoea, and morbid secretions, as furnishing a primary indication, endeavouring to employ the necessary remedies adequately, and never losing sight of the indication, whether the symptoms were slight or severe, until they had subsided. In the history of cases of phthisis of which I have had the treatment for periods of years, I am convinced that, by attention to this point, the chain of morbid action leading to intestinal disorganisation has been broken at its first link, and this sometimes repeatedly in the same individual, with the result both of prolonging life and of preventing or circumscribing and alleviating one of the most distressing of the local manifestations of the disease.

Of the 10 cases in which tubercles were met with independent of ulceration, 8 were seated in the ileum alone, 1 in the cæcum, and 1 in the colon.

The frequency with which different portions of the canal were ulcerated was as follows:—

The ileum alone	52 times.
The cæcum alone	10 "
The colon alone	9 "
The rectum alone	11 "
The ileum and cæcum	25 "
The ileum and colon	9 "
The ileum, cæcum, and colon	4 "
The ileum, cæcum, and rectum	2 "
The colon and cæcum	3 "
The colon and rectum	1 "
The colon, cæcum, and rectum	1 "
The whole intestinal canal	2 "
Part unrecorded	1 "

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The frequency according to age is thus represented:—

From birth to 15	0
From 15 to 30	64
From 30 to 45	34
From 45 to 60	14
Above 60	0
Age unknown	9

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Of ulceration of the rectum, there were 15 cases in the 566 cases of tubercle, and 16 in the non-tuberculous cases. Although these figures appear to indicate a higher ratio in the former than in the latter, Dr. Chambers advances several considerations showing that ulceration of the rectum and fistula have no peculiar dependence on the tuberculous constitution, and that it is an error to regard fistula in ano alone as a proof of the existence of the disease. These statistics have also led their author to the conclusion, that although, where tuberculous disease is far advanced, operations for fistula tend to shorten life, yet, where the fistula is recent, a small part only of the lung being affected, and the patient retaining a considerable amount of vigour, this harassing inconvenience ought to be cured. According to the statistics, also, ulceration of the rectum in the tuberculous, as in the non-tuberculous, is a disease of middle and advanced life, and rare in youth—another circumstance tending to show that it has no especial dependence on the tuberculous constitution.

In a table showing the complications of tuberculosis pulmonalis with other diseases, as observed in the out-patients of the Consumption Hospital, by Dr. Cotton (*Lib. cit.*, p. 48), presently to be introduced, in 1000 cases, there were three only of fistula. Dr. Cotton arrives at a conclusion at variance with Dr. Chambers's view, viz., that, wherever fistula was observed, the tubercular disease was singularly kept in check by it; and that "the propriety of the usual custom of allowing fistula in consumptive persons to remain uninterfered with was well illustrated". Dr. Theophilus Thompson, in his recent work on phthisis,* speaks even more decidedly on this point. A few years since, having the care at one time of nine consumptive patients affected with fistula, he found that, although the disease had not in any instance advanced beyond the first stage, its average duration had been two years and nine months; his own estimate of the usual average duration of the disease throughout its stages not exceeding eighteen months. Hence fistula appears to retard consumption, and, independent of the wound in tuberculous subjects being inapt to heal, an operation is of "questionable propriety".

Perforation of the Intestines. Excluding the cases of *fistula recti*, perforations were met with in 9 out of 128 cases, or 7 per cent. of those cases in which ulceration occurred. In non-malignant ulceration, independent of tuberculosis, they occurred in 26 per cent. The author refers the comparative infrequency in the disease before us, to the tendency of tuberculous ulcers to spread laterally along the mucous membrane, and to thickening of the peritoneal coat. Nor ought the explanation given by Louis to be omitted: viz., that when the mucous and cellular coats have disappeared, the muscular fibres gradually thicken, and it is only after a

more or less considerable lapse of time that their destruction commences, and even then its occurrence is but rare. The ulceration of fever and of tuberculosis contrast remarkably in this respect.

The Mesenteric Glands. In the 566 cases, there were 39 of tubercle, 52 of tumefied glands which might or might not contain tubercle, and two of chalky deposit. Louis found these glands tubercular in 23 out of 102 adult phthisical subjects, and Rilliet and Barthez in one-half of the tubercular infants they examined. The comparative infrequency in the present cases, as compared with others, is manifestly owing to the small proportion of children who die in general hospitals. The statistics confirm the conclusion arrived at from former investigations, that even excluding infants, the deposit of tubercle in the mesenteric glands is a disease of early life. The smaller ratio of cases as compared with the ratio in Louis' cases is, no doubt, in part, if not wholly, attributable to the large proportion of cases of death in St. George's Hospital from diseases other than tuberculosis although with tubercle; for although tuberculosis mesenterii is sometimes the primary local affection, tuberculosis pulmonalis is much more frequently so. Six of the cases of diseased abdominal glands were met with where the lungs were exempt. (Table xix, ASSOCIATION JOURNAL, 1853, p. 1031.)

The Kidneys. The kidneys were affected in 91 cases; with tubercle in 76, and with "scrofulous degeneration" in 15; so that in Dr. Chambers's Table, the kidneys stand the fourth in the order of frequency with which the organs are affected. In my own they stand the tenth in children and the eighth in adults. That is to say besides the lungs, the intestines, and the abdominal glands, in children the bronchial glands, the pleuræ, the peritoneum, the nervous centres, the spleen and the liver were more frequently affected than the kidneys; and in adults the cervical glands, the spleen, the prostate gland and the ovaries. Tubercles occurred in 17.6 per cent. of the cases wherein the lungs were affected, and in 15 of the 47 cases where the lungs were free. The period when they were most frequently found was from 15 to 30 years of age, viz., in 21.1 per cent. The next period being that under 15 years of age, in which they occurred in 16.2 per cent. only. Dr. Chambers remarks, that the comparative infrequency of tubercle in the kidney, in children, is contrary to Dr. Carswell's experience, but that this distinguished pathologist has not furnished us with a statement of the number of cases on which his opinion is founded. Rilliet and Barthez, however, give 49 cases of tubercle in the kidneys in 312 tuberculous children, which is 15.7 per cent., presenting a very close approximation to the proportion in St. George's Hospital.

It has already been stated that the actual total of tuberculous males was 39.6 and of females 167. Of the former, 18.6 per cent., and of the latter, 7.7 per cent., had tubercle in the kidneys. This is a fact, and like all the facts in this laborious statistical work, deserves to stand upon record, so that when a mass of facts of a similar nature has accumulated they may be compared, and general principles deduced from them. But, assuming that these ratios may be taken as the representatives of the ratios in which the kidneys are affected with tubercle in the male and female population generally, Dr. Chambers draws the following inference. A woman, tubercular by diathesis, is more likely to have pulmonary affection than a man, but not half so liable to have the morbid material deposited in the kidneys; and as the principal hygienic distinction between males and females consists in the exposure of the former to the weather when young, by reason of their dress, and when adult, from their occupations, we may infer that climatic influences are more injurious, as far as tubercle is concerned, to the renal than to the pulmonary organs. In explanation of this, Dr. Chambers remarks that the physiological duty of the lungs is to equalise those changes, but the kidneys are so intimately connected with the skin that the anomaly is explained, leaving no surprise at their taking on disease from exposure to atmospheric variations. Dr. Chambers takes up Dr. Matthew Troy's theory, that it is the secreting function

* Lectures on Consumption, 1854, p. 125.

of the sebaceous follicles which may be supposed to be interfered with by these influences, so that an unformed fatty matter is thrown back upon the blood, in which, at the same time, a febrile or anæmic state has caused an excess of fibrine, which gives "a rational motive cause" for the deposit of tubercle.

The remark also occurs that the more frequent deposit of the morbid material in the kidneys of tuberculous males, and in the lungs of tuberculous females, seems to indicate that, in producing their "unsound diathesis", atmospheric influences act principally through the external surface rather than the pulmonary organs. This would seem to imply that the affection of the organ produces the diathesis, a view in which I cannot participate. There is nothing in the facts to show that the influences in question are anything more than the determining causes of the particular localisation of a pre-existing general disease. I am here led to repeat what I have upon several occasions urged, that one of the most essential points in the pathology of this disease is to distinguish between the causes of the general disease and the causes of its local development.

The Nerve Centres. The small proportion of children admitted into General Hospitals, the acute nature of attacks of cerebral disease, and other causes, render the number of cases of tuberculosis cerebri confessedly very limited. Frequent as this disease is in the population at large, of the 2161 autopsies of all diseases, and 566 with tubercle, there were only 32 cases of tubercular deposit in the nervous centres; 25 being in the nervous substance; 7 in the membranes only, and 1 abscess or vomica. In all 5.8 per cent.

The secondary pathological appearances or consequences of the deposit were: 1. *With Deposit in the Membranes.* Softening of the nervous substance; fibro-purulent inflammation of the membranes; effusion of serum; in one case a blood clot. 2. *With Tubercle in the Nervous Substance.* Fibro-purulent inflammation of the membranes; local softening of the nervous mass; scrofulous abscess; effusion of serum in the cavities; thickening of the membranes; congestion.

In 566 autopsies containing tubercle in some of the organs, there were 17 cases of fibro-purulent inflammation of the membranes of the brain, or 2.6 per cent., omitting such cases as might be deemed accidental. In 1595 autopsies of subjects free from tubercle, omitting accidental cases, and also cases of pyæmia, there were only 4. A statistical fact having the most important practical bearing as tending to confirm the general opinion, that idiopathic inflammation of the membranes of the brain is almost peculiar to the tuberculous constitution.

Softening of the brain of every variety was observed, red, white, and yellow. It occurred in 1.7 per cent. of the tuberculous cases, and in 1.1 per cent. of the non-tuberculous cases. Serous effusion in 6.7 per cent. of the former, and 9.3 per cent. of the latter.

After confirming the observation that tubercle may form and remain inert in the brain (that is to say, produce no symptoms), the author remarks that the symptoms tending to destroy existence are the result of the secondary lesions, and that our treatment ought to be directed to the relief of the symptoms. A very interesting case in point is given. In December 1844, Dr. Chambers attended a boy, aged ten, who was attacked with fever, delirium, and headache, commencing by a fit, and at the same time with pleurisy. He recovered and got about again. In April 1845, he was again attacked with cerebral symptoms and died comatose. The autopsy justified the diagnosis, that both cephalic attacks were dependent on tuberculosis as well as the pleurisy, yet the first one did not prove fatal.

The author gives as a summary the following deductions: 1. That the secondary consequences of tubercle in the brain were the same, whether the tubercle was in the substance or membranes.

2. That the symptoms of these secondary consequences, were, in the case of inflammatory action, pretty uniform; but otherwise obscure and variable.

3. That, independent of tubercular deposit, idiopathic in-

flammatory conditions of the meninges were most common in the tubercular diathesis, nay, almost peculiar to it.

4. That the same diathesis disposed also to softening of the cerebral substance, probably of an inflammatory character; but that other diseases had nearly as great a tendency to produce softening; whether truly inflammatory or not is unknown.

5. That serous effusion on the brain was less usual in tuberculous persons than in others.

The Peritoneum. Tubercles were met with in this membrane in 49 cases. In 8.3 per cent. of all the tubercular males, and in 10.1 per cent. of all the tubercular females. In 7 cases they occurred without any tubercles in the lungs, in 1 with chalky concretion only, and in 42 cases together with tubercles in the lungs. These statistics confirm the less complicated records of death from tuberculosis, that the localisation of the disease in the peritoneum is inversely as the age, being most common in the earliest periods of life, and gradually decreasing as age advances.

The Bronchial Glands. Tubercular disease of the bronchial glands, as of the peritoneum, prevailed in an inverse ratio to the age. In the 503 cases in which the lungs were implicated, the glands were affected in 34, viz., they were tubercular in 24, enlarged in 7, and chalky in 3. The disease in these glands generally attacks both sets, a circumstance which is apt to lead to difficulties in diagnosis. In the 47 cases where the lungs were free, these glands were affected 9 times, being tubercular in 7 and chalky in 2.

A brief account is given of the following interesting cases of tubercular disease of the bronchial glands, the lungs being exempt.

1. Cheesy and calcareous tubercle in the bronchial glands apparently with an entire absence of symptoms.

2. Scrofulous disease of the vertebrae pressing the spinal cord in the neck. Soft tubercular matter (apparently secondary) in the nearest bronchial glands.

4. Both sets of bronchial glands filled with scrofulous matter. An ovarian tumour. Death from sudden effusion into the pleura.

5. A large quantity of calcareous matter in the bronchial glands. Dilated heart. The case simulating tuberculosis pulmonalis.

6. Psoas abscess. Tubercular matter in the bronchial glands.

7. Tubercular matter in the bronchial glands. No long history of chest symptoms.

8. Scrofulous and calcareous matter in the bronchial glands. Died of fever and pneumonia.

9. Recent tubercular matter in the bronchial glands pressing on the vena cava. Old chalky matter in the pulmonary tissue. Death from ulceration of the pylorus, apparently from scirrhus, as shewn by the state of the neighbouring glands. Perforation and fatal peritonitis.

This part of the subject is concluded with some "General Remarks on the Seat of Tuberculosis", in which is advanced as a probability that undue "venosity of the blood" promotes the formation of tubercle. This view is founded upon the order in which the viscera stand in the author's own table, when arranged according to the frequency with which they become affected, viz.:—1st. The lungs; 2nd. The intestines; 3rd. The mesenteric glands; 4th. The kidneys. This is regarded as the order of the degree of venosity of the blood the organs hold. The lungs, the author observes, receive a large quantity of venous blood for the purpose of being arterialized; the digestive canal, with its valveless portal veins, comes next in point of venosity; then the Mesenteric glands; and lastly, in the kidneys, the Malpighian bodies must cause a great excess of venous blood to be detained in their tissue. On the other hand, tubercle is most rare in the skin, the muscles, the arterial coats and the cellular tissue of the extremities, where the circulation of the blood is more free, is kept in forced activity by the motion of the parts, and is incapable of more than temporary congestion. Those parts of the lungs, again, where the tendency to tubercle is greatest, viz.: the upper lobes, are those in which there is least

motion, the fluids being driven up, as it were, into a corner, and consequently the congestion and venosity of the blood is at its maximum; and again, in children, whose rapid breathing and varied motions prevent any stagnation in the lungs, the blood being thrown upon the abdominal viscera are thus subjected to congestion, and are much more frequently affected with tubercle than in adults. It is admitted that this last circumstance may be due to the greater liability of children to acute tuberculosis.

The expression "venosity of the blood" is extremely indefinite. It may mean, for instance,—1st. Blood which is not sufficiently depurated in the lungs, thereby containing an excess of carbonic acid gas, and being insufficiently oxygenized; or—2nd. Blood insufficiently depurated in the kidneys, and thereby containing the effete nitrogenous elements of the tissues; or—3rd. Blood containing an undue proportion of unassimilated nutritive matter received from the alimentary canal. I take it, that the term "venosity of the blood" in the above argument is employed in the first sense. But, if the formation of tubercle depends upon venosity in this sense, how does it happen that the liability to tubercle is inversely as the age of the individual? In early life the blood is eminently arterial, becoming proportionably more venous as age advances, and yet we have an almost uniform decrement in the liability to tuberculosis. (ASSOCIATION JOURNAL for 1853, p. 1031.) How does it happen, that in confirmed drunkards, in whom venosity of the blood with congestion of the lungs, portal system, and kidneys, are prominent circumstances, that tubercle is not more frequent? In such subjects active tuberculosis is a comparatively rare occurrence, and yet here are the elements for its production in a marked degree. Without adopting Professor Rokitsky's doctrine of heart diseases absolutely excluding tuberculosis, we should nevertheless expect that the venosity of the blood which accompanies them would more frequently result in the development of tubercle. Take gout again: there is no disease in which congestion of the portal system is more marked; and yet, as we shall presently see, gout and tubercle are very rare concomitants indeed. Even the order in which the organs stand in Dr. Chambers's table, and upon which he founds his view, is widely different in the other table several times herein referred to. In children under 15 years, the bronchial glands stand far above the intestines, mesentery and kidneys, as to the frequency with which they are affected with tubercle, and the pleuræ and peritoneum far above the kidneys; in the adult also the cervical glands stand above the kidneys. I do not advance this as proving the converse of Dr. Chambers's view, but I repeat what I have said elsewhere, (*On Tuberculosis*, p. 359), that these statistics are upon too limited a scale, and are not derived from sufficiently uniform data to justify general inferences. The above and other facts of science which might be advanced, appear to me to be totally opposed to the idea that venosity of blood, in the sense in which it is here employed, is favourable to the production of tubercle. It should be remarked that I separate all in the above argument that relates to the quality of the blood from that which relates to its congestion or stagnation. There is no evidence whatever to justify an assumption that congestion of the vessels, the blood being healthy, or the stagnation of healthy blood, can produce tubercle, although there can be very little doubt that the congestion of vessels conveying tuberculous blood promotes the deposit of tubercle. The simple question here is, whether the quality of "venosity" in the blood promotes the tuberculous metamorphosis.

If the term "venosity" be allowed to admit of the third of the above interpretations, that is to say, to represent blood containing a large proportion of organic material that has not undergone secondary digestion, and is not yet perfectly assimilated to the nature of blood, such as the blood of the pulmonary artery which contains a large proportion of chyle, or the blood of young people as compared with that of the old, where the nutritive processes

being in a high state of vigour, there must be a larger proportion of "young blood" in the vessels; the hypothesis is then identical with one entertained by Mr. Simon and myself,—viz.: that the analogue of tubercle may possibly be formed in the blood from the imperfectly assimilated or new material. Again, if "venosity" comprises the retention of the effete matter from the secondary digestion of the nitrogenous tissues, or the secretions of particular organs, this view of the origin of tubercle would be consistent with Dr. Troy's theory of a remora of the cutaneous secretions, and, in fact, a generalization of that view of the case. At all events, it does not appear to me that we can gain anything by the employment of so general a term as the one in question. (*On Tuberculosis*, pp. 560, 574, 763, etc.)

I now arrive at the third head under which this part of the subject divides itself,—viz.: the facts contained in the works before us relating to:—

III. THE COMPLICATIONS OF TUBERCULOSIS WITH OTHER DISEASES.

Dr. Cotton concludes, that consumption has no absolute antipathy or antagonism to any other disease, beyond that which is common to every morbid condition; the general rule being admitted that, subject to occasional exceptions, the system cannot be under the influence of two dissimilar actions at one and the same time.

The following table is a record of Dr. Cotton's clinical experience on this important point:—

TABLE XXII.—Complications with various diseases in 1,000 cases of Tuberculosis Pulmonalis in the Out-door Department of the Consumption Hospital, Brompton.

Diseases.	Males, 562 cases.	Females, 418 cases.
Rheumatism	4	2
Gout	2	0
Disease of the heart	2	1
Diabetes	2	0
Epilepsy	1	0
Prolapsus uteri	—	3
Fistula	3	0
Herpes	1	1
Psoriasis	0	3
Purpura	1	0
Strophulus	0	1
Lichen	1	0
Bronchocele	0	1
Emphysema	3	2

Thus, even rheumatism, gout, disease of the heart, bronchocele, and, it may be added, ovarian disease, and intermittent fever, each of which has been said to exclude, and to be mutually excluded by tuberculosis, are more or less frequently met with in complication with this disease. Gout occurred in two male patients who had strong hereditary claims to it, and were much advanced in phthisis, and Dr. Cotton has met with other instances. Two of the cases of diseased heart consisted of valvular obstruction, evidently of long standing, in all probability long antecedent to the commencement of phthisis. In both cases of diabetes the saccharine condition of the urine prevented the phthisical symptoms. Again, in Dr. Theophilus Thompson's recently published *Clinical Lectures*, we have instructive examples, fully detailed, of the association of tuberculosis with hysteria; I have myself seen this not only in females, but in the early stage of phthisis in males. We have instances of the co-existence of two constitutional diseases differing widely from each other in their nature and causes, and to say the least of it, "uncongenial" to each other. I do not cite these facts to prove more than legitimately flows from them,—viz.: their occasional co-existence; but as leading to the remark that the more exceptional such coincidences may be, the greater the necessity for enlarging our statistics, and also of recording detailed histories of all such cases.

In collating the materials for my work on tuberculosis, I found the relation that subsists between tuberculosis and Bright's disease of the kidney, and the relation between tuberculosis and heart disease, two of the most difficult subjects with which I had to deal. The difficulty arose from the defects in the pathology of these diseases, and the opposed statements extant, especially the statistical statements, of writers of authority, leaving both subjects in a very unsatisfactory state. The *Decennium Pathologicum*, and some other recent investigations, furnish us with additional facts and statistics relating to these questions; how far they may be found to elucidate them the reader will now have an opportunity of judging.

Bright's Disease. A very decided opinion has been entertained that chronic degeneration of the kidneys is a "scrofulous" or "tuberculous" affection; but the statistics hitherto published, to prove or disprove this opinion, are contradictory (*On Tuberculosis*, p. 304); those before us are, therefore, very important, as placing this interesting question in a new point of view.

In the 2161 autopsies, this disease, in some of its grades or forms, was met with in 454, that is to say, in nearly 20 per cent.

In the 454 cases with Bright's disease, 86, or 18.9 per cent., had tubercle in the lungs.

In the 1707 cases without Bright's disease, 417, or 24.4 per cent., had tubercle in the lungs.

In 88 cases in which small tubercles of the kidneys were met with, 15 only, or 17 per cent., had chronic degeneration.

It is especially noted that, in the form of Bright's disease in which the kidney is enlarged, and which, according to the records of St. George's Hospital, occurs in early life, or most frequently from fifteen to forty-five years of age, the coincidence of tubercle was met with in 25 per cent.; whereas, in the atrophic forms of the disease, which become more frequent as age advances, tubercle was met with in only 16.5 per cent.

Of 84 cases of pulmonary tubercle in complication with Bright's disease, 51, i.e. 61 per cent., had vomicae.

Of 417 cases without Bright's disease, 69.3 per cent. had vomicae.

From these statistics, if they conceal no fallacy, it appears that, notwithstanding disease of the kidney is not mentioned in Dr. Cotton's table of 1000 cases of phthisis observed during life, because, as expressly stated, either it did not exist, or, if it did exist, it was not diagnosed in any of the cases—a circumstance perhaps in part referrible to our present system of out-door hospital relief: still, in the ultimate result, as tested by *post mortem* examinations, tuberculosis and Bright's disease are among the most common complications. Dr. Chambers evidently arrives at the conclusion that the complication is accidental, rather than bearing any necessary relation of cause and effect. He also considers that tuberculosis diminishes the liability to Bright's disease, rather than that Bright's disease confers any immunity from tuberculosis. These views appear to be supported by the fact, that the complication is most common in that form of the kidney degeneration which occurs most frequently at the period of life at which tubercular disease is also most frequent, although the kidney disease is less frequently met with in tuberculous than in non-tuberculous subjects. Even the deposit of tubercle in the kidney itself appears to be rather a preservative against than an exciting cause of the disease.

When we regard these statistics in connexion with facts previously recorded, we cannot fail to recognise great discrepancy, not to say confusion, in the subject. On Dr. Bright's authority, we find, in 100 cases of albuminuria, that the coincidence of tuberculosis was rare; and Dr. Theophilus Thompson, of the Consumption Hospital, confirms the experience of Dr. Bright and Dr. Cotton as to this rarity. After reciting the fact that, on testing the urine of all the patients in Guy's Hospital, being a general hospital, on one occasion Dr. Rees found 17 per cent. with albuminous urine; and, on another, the nitric acid test as well as heat having been applied, as much as 9 per cent.:

yet, in the Consumption Hospital, out of ninety patients, Dr. Thompson found only two where urine contained albumen; and the observation of this able physician, for a considerable period during which it has been the practice to test for albumen, points clearly to the conclusion that phthisis tends rather to prevent than to promote the occurrence of renal disease.

In reasoning upon this matter, we must not overlook the fact that Dr. Chambers's statistics are derived from *post mortem* data; and that, out of 566 cases of tubercle found after death, in 171 it was in a solid state, in the majority of which it was not the cause of death. I think I make out that, of the 86 cases of complication with this disease, in 35 the tubercle was in a state of crudity.

Diseases of the Heart. Pathologists have generally admitted that diseases of the heart are comparatively infrequent in the subjects of tuberculosis, and especially in those labouring under tuberculosis pulmonalis. Rokitansky gives a very decided opinion that heart disease excludes tuberculosis, and he extends this even to congenital malformations; but, in the *Decennium Pathologicum*, there were 11 cases of irregular formation of the aortic valves, in four of which the lungs were tubercular. This circumstance, with the statistical facts generally, has led Dr. Chambers to the conclusion that it is the tuberculosis which excludes, or rather renders the heart disease less liable to occur than where it is absent.

The following is a statistical view of the facts, as recorded in the *post mortem* books of St. George's Hospital.

TABLE XXIII.—Comparative view of the frequency of Heart Disease in Tuberculous and Non-Tuberculous Subjects.

Lesions of the heart, and its appendages.	In 517 cases of tuberculosis of the lungs,	In 1644 other cases,
Pericarditis.....	21 per cent	7.5 per cent
Old internal adhesions of the pericardium	2.7 "	4.6 "
Old external adhesions of the same (perhaps irregularly recorded)	7 cases.	10 cases.
White spots	7.5 per cent	9.6 per cent
Recent fibrin deposited in the valves..	0.7 "	2.3 "
Atheroma of valves	2.9 "	10.9 "
Hypertrophy alone	2.9 "	9.4 "
Hypertrophy and dilatation.....	2.5 "	8.6 "
Dilatation alone	9.2 "	14.9 "
Atrophy	1.3 "	0.7 "
Excess of adipose tissue	0.9 "	2.5 "
Fatty degeneration (irregularly recorded)	3 cases.	10 cases.

This table shows how little liable inflammation of the lungs is to spread to the pericardium in tuberculous cases; and the analysis of the cases indicates still more certainly that, when pericarditis does occur, it is probably from accidental causes, and not from the vicinity of the lungs and pleura. The explanation given of the comparative immunity from the pathological effects of pericarditis, and from other marked forms of heart disease, is, that non-tuberculous individuals are most subject to rheumatic fever. I believe the fact admits of an ulterior explanation, viz., that the condition of the blood, predisposing not only to rheumatic fever, but to some of the most prominent heart diseases, independently of those which take their origin from attacks of rheumatic fever, is in some important particulars the very antithesis of the condition of the blood which characterises tuberculosis.

The table furnishes new examples of a fatty condition of the heart occurring occasionally even in tuberculosis. In five cases, there was an excess of fat about this organ. At the same time, the detail shows that the disease had not run its course in its usual uninterrupted way. The tuberculosis, Dr. Chambers remarks, did not appear, in any of

them, to be in an active state. Bizot, Hasse, and others, have also given instances of fatty heart in this disease; but, in their cases, it is stated almost uniformly, that it was associated with a fatty condition of the liver. The observation, that the fat is sometimes replaced by a reddish yellow jelly, is also repeated by Dr. Chambers. We do not find any fact bearing upon the important statement made by Dr. Quain, that, in phthisical subjects, the muscular substance of the heart is sometimes replaced by the fatty principle.

In my work *On Tuberculosis*, I have shown that there is a great deal of evidence extant tending to prove that, in uncomplicated tuberculosis, the heart is comparatively small and feeble; and I have given this as one of the characters of the constitutional disease. The view I have there taken is confirmed by the above table, which illustrates very remarkably that all the diseases of the heart presupposing excess of nutrition, plethora, "inflammation" of the blood, or tonic action, are much less frequent in tuberculous than in non-tuberculous subjects; that, when we look to dilatation with hypertrophy, the difference is less, while, in dilatation alone, without obvious hypertrophy, the difference is very greatly diminished. On the other hand, the frequency of atrophy of the heart is more than double in the tuberculous, as compared with the non-tuberculous cases. The facts, taken as a whole, strongly confirm the view that atrophy of this organ is the direct effect of the constitutional disease.

But, at the period I allude to, it was those diseases of the heart that most frequently coexist with tuberculosis pulmonalis, and more especially the triple relation of phthisis, emphysema, and hypertrophy of the heart, which constituted an apparent anomaly. I must confess to my total inability to comprehend this relation on the then received doctrines of pathology; and in this instance, as in others, where I could not arrive at a clear induction, I avoided any attempt at explanation, hoping that the advance of science would clear up what appeared to me to be very little understood.

Dr. Gairdner, of the Edinburgh Infirmary, has thrown some light upon this subject; and, if he has not offered a totally unexceptionable explanation, he has, I believe, opened up the right path. His observations will be found in "A Review of certain Works on Bronchitis, Pulmonary Collapse, and Emphysema," in the *British and Foreign Journal* for April 1853; and in an article "On the Causes of Dilatation of the Heart," in the July number of the same journal. The opinions of this author are founded upon a statistical analysis of 84 very carefully observed mixed fatal cases, furnishing 13 cases, or 15.5 per cent., of enlargement of the heart; and 414 mixed fatal cases, less exactly observed, furnishing 49, or 11.4 per cent.; the interpretation given of the statistical facts being supported by a chain of inductive reasoning which demands the attention of all who are interested in the subject.

In the first place, Dr. Gairdner's researches lead him to the conclusion that atrophic disease of the lung, with condensation, that is, pulmonary collapse—a condition allied to the foetal state, produced by various causes, but totally distinct from inflammatory hepatisation—is the invariable accompaniment of emphysema of the lung; and that the occurrence of this collapse in one part of the lung is the cause of emphysema in another portion. That emphysema is in fact a mechanical effect of atmospherical pressure, and consists of "an increase in volume of those portions of the lung to which the air has access, for the purpose of supplying the place of diminished volume in those parts from which it is excluded," and can only be produced when the volume of the lung is directly diminished in relation to the space it has to occupy in inspiration, and hence is never found in connexion merely with tubercle or any other deposit, or solid or fluid collection whatever, contributing to fill up the thorax. Neither, on the other hand, can it occur where large cavities with flaccid walls are distributed throughout the lungs, even in connexion with atrophy; because, in this case, the walls of the cavities themselves give way to the expansive force. Thus, we

are given to understand why it is that emphysema is comparatively rare in connexion with tubercle in its active and progressive stages; and why, on the contrary, it is frequently found in connexion with arrested phthisis and retrogressive tubercle, particularly when the individual retains strength and respiratory power sufficient for the full exercise of the inspiratory force.

Having thus explained the occurrence of emphysema in atrophic diseases of the lung generally, although I am now looking to the application of the author's views to tuberculosis in particular, we come to the point respecting the connexion of tuberculosis pulmonalis with heart disease. Dr. Gairdner recognises the generally admitted fact, that phthisis does not, as a rule, tend to hypertrophy, but is attended with a positive diminution in the bulk of all the cavities of the organ—a view fully borne out by his own statistics, and also, as already shown, by the details in the above table from the *Decennium Pathologicum* of St. George's Hospital. But, notwithstanding this, a certain proportion of cases is accompanied with hypertrophy and dilatation, especially of the right cavities; and it is the explanation of this fact which is so important to us in the study of tuberculosis in connexion with heart disease.

Dr. Gairdner shows that a very large proportion of the total number of cases of hypertrophy and dilatation of the heart which are not produced by valvular disease are connected with disease of the lung; and that, as in the case of emphysema, it is chiefly, if not exclusively atrophic diseases of the lung, or those that tend to diminution of its volume, that have any appreciable influence in dilating the heart; that, in fact, both emphysema and hypertrophy or dilatation of the heart are secondary results of atrophy of the lung. But hypertrophy of the heart, not dependent on valvular disease, is associated with emphysema of the lung in a larger proportion of cases than with any other forms of disease; and in such cases, to the contrary of the generally received doctrine, the emphysema is the primary, and the heart disease the secondary affection; in support of which view, it is remarked, that probably nine-tenths of the cases of cardiac hypertrophy, not referrible to valvular disease, are found to be connected either with emphysema of the lungs, or with some of the atrophic affections characterised by collapse of the lung.

Thus, Dr. Gairdner's doctrine is, that cardiac dilatation and emphysema have no direct relation of cause and effect to each other, but the two morbid conditions have one common cause, viz., partial collapse of the lung. In applying this to tuberculosis pulmonalis, it appears that, in the 84 mixed cases accurately examined, there were 29 cases of tubercle in the lungs, in 3 of which hypertrophy of the heart occurred. The following ratios were observed:—

Hypertrophy of the heart in tubercular cases ..	10.3 per cent.
Hypertrophy of the heart in mixed cases	15.5 "
Tubercle in cases of hypertrophy of the heart ..	23.3 "
Tubercle in mixed cases	34.5 "

These ratios are confirmations of those contained in Table xxiii, shewing the absence of any direct relation between the deposit of tubercle in the lung, and hypertrophy of the heart; but the main point is, that Dr. Gairdner's pathological researches confirm the conclusion, that tuberculosis, viewed as a constitutional disease, is attended with an atrophied state of the heart, a positive diminution of its bulk, a condition which may attend the pulmonary manifestation of the disease throughout all its stages, as shewn in Table xxiii; still, hypertrophy and dilatation do occur in a considerable number of cases in connexion with tubercle in the lungs, these again frequently occurring in connection with emphysema of the lungs; and that both the emphysema and the hypertrophy are produced by a special state of the lung, resulting from the existence of tubercle deposited in the organ. In Dr. Gairdner's words—"Tubercular disease of the lung produces hypertrophy of the heart only when combined with pulmonary atrophy and induration. Retrograde or obsolete tubercle, with contracting or obliterated cavities,

concretions, cicatrices, etc., is very generally associated with secondary disease of the heart; while advancing tubercle has no appreciable influence (or rather, is frequently the cause of cardiac atrophy)."

The hypertrophy of the walls of the heart is held to be secondary to the dilatation of its cavities in connexion with which a very remarkable circumstance presents itself in Dr. Chambers's Table,—viz.: The large proportion of cases of tuberculosis in which dilatation alone was noted,—viz.: 9.2 per cent.; which of hypertrophy alone, and of dilatation with hypertrophy, there were respectively only 2.9 and 2.5 per cent., seeming to indicate that the atrophied walls of the heart of tuberculous subjects are prone to give way to any extra-dilating force, but the direct debility which accompanies that atrophy is unfavourable to the increased action which results in hypertrophy.

Those who take an interest in this department of pathology, will recognize in this lengthy communication new facts and reasonings of considerable importance to the elucidation of some of the dubious points in the history of this disease, and the tendency of these statistics appears to be, to establish, as a general principle, that while a tuberculous condition of the blood is to a very great extent unfavourable to the development of some other constitutional diseases; these same diseases are extremely prone to merge into or become complicated with, and to terminate in tuberculosis.

Norfolk Crescent, Hyde Park Square, Jan. 1854.

FACTS CONTRIBUTED TO THE PATHOLOGY OF DRY GANGRENE.

By JOSEPH SAMPSON GAMGEE, Esq.

MUCH as this disease has been studied by surgical pathologists, since Mr. Percivall Pott first attracted prominent notice to it, "professional opinion is still unsettled as to its cause".*

Baron Dupuytren referred it to arteritis.† His opinions and observations were characterized as *inconclusive and defective* by Sir Robert Carswell, who maintained‡ that calcification of the arterial coats and occlusion of the vessels is the cause of the disease, and that there was no evidence of idiopathic inflammation of the large arteries giving rise to it. His criticism has the assent of Sir B. Brodie, who is certain that "M. Dupuytren is mistaken on this point".§ And if Mr. Liston,|| in whose opinion the Baron's attempt to connect mortification with an inflamed state of the arterial coats is not confirmed by experience. Professor Linoli¶ held a medium view; that arterial ossification is the remote, and inflammation the proximate cause. Professor Velpeau** expresses himself dissatisfied with the state of knowledge on this disease, and cites several cases of it in which he was unable to discover any anatomical change whatever to account for the phenomena. Many other instances of dissenting opinions might be quoted, not only with reference to the pathology, but also to the treatment of the disease; but enough has, I think, been adduced to demonstrate the desirability of adding facts which are calculated to exercise an influence in the solution of the question.

CASE I. Gaspara Innocenti, aged 62, was admitted into the female clinical ward of Santa Maria Nuova, Florence, under Professor Ranzi, on the 30th of September, 1851, when the following notes were taken by me. She is a

peasant from the Appennines, accustomed to live on bread, beans, chesnuts, and weak wine; only eats meat twice or three times in the year. About sixteen days ago, she experienced severe burning pain in the whole of the left hand, from the wrists to the ends of the fingers; the latter acquired a black colour in the course of four or five days, and the gangrene has ever since gradually extended.

The pulse is very visible in both carotids, 120 in the minute. Pulsation is distinct in the outer side of the right subclavium, not so in the left. The arteries of the right arm and forearm pulsate well. Those on the left side cannot be felt. The left posterior tibial artery pulsates indistinctly, the right one does not do so at all. The same remark applies to the dorsal arteries of the feet. Both lower limbs as far up as the knees are œdematous.

The fingers of the left hand are semi-flexed, cold, motionless, senseless, black, and somewhat shrivelled; this condition involves the whole hand as far as the wrist.

The following temperatures are ascertained with the centigrade thermometer, care being taken that all the parts are similarly circumstanced as to covering:—

Ward	...	...	18½°
Inside of cheeks...	...	...	24°
Both arm pits	...	...	24°
Bend of elbow	...	{ left	21°
		{ right	23°
Palm of hand	...	{ left	20°
		{ right	23°
Dorsum of foot	...	{ left	22°
		{ right	20°

Strength gradually diminished; the gangrene extended a little up the forearm, but did not appear in any other part of the body; death occurred at 7 p.m. on the 7th October. Treatment adopted was bark and opium, with tolerably good diet.

Examination forty hours after death. The abdomen contains about two pints of turbid greenish fluid, with flocculi of lymph floating in it. The viscera of this cavity are healthy.

About one pint and a half of limped serosity in the chest; lungs healthy; heart small and flaccid; orifices healthy; with the exception of some calcareous deposit at the insertion of the aortic semilunar valves.

Atheromatous degeneration manifest in the arch and descending portion of the aorta, especially around the orifices of the intercostal arteries. There is one patch of calcareous degeneration near the origin of the subclavian artery, and another above the origin of the celiac axis. Firmly adhering to the last one, is the lower half of a blood clot measuring 2½ inches in length, ½ an inch in breadth, and a little more than a line in thickness; the upper half of the clot is loose, of dark red colour and rather soft; but the lower half is adherent, of reddish yellow colour, and firm.

The right common and external iliac arteries are almost completely obliterated by a blood clot, the upper half of which is of darkened colour, more uniform shape, and softer consistence than the lower half. The middle portion of the clot, including some of the dark red and soft, and some of the light red and consistent, is firmly adherent to the arterial coats, which appear healthy. A fine clot is continued into the right external iliac for rather more than an inch.

The left subclavian artery is decidedly redder than are the other great vessels springing from the aortic arch: on careful examination, the redness is seen to be due to capillary injection; this is most marked along the concavity of the artery. This injection extends as far as five inches beyond the origin of the superior intercostal; as far as this point the colour of the arterial coats is deep red; beyond it, they are of normal colour, but very much contracted. On comparing the brachial radial and ulnar arteries of the two sides, those on the left prove to be decidedly the smallest.

On slitting open the left subclavian artery from its commencement onwards, an obliterating clot seven inches in

* Mr. Syme, Contributions to the Pathology and Practice of Surgery. Edinburgh: 1848. p. 9.

† Leçons Orales de Clinique Chirurgicale. 2d ed., t. iii, p. 268.

‡ Illustrations of the Elementary Forms of Disease. Article "Mortification".

§ Lectures Illustrative of Various Subjects in Pathology and Surgery, 1846, p. 355.

|| Elements of Surgery. By Robert Liston. 2d ed., p. 42.

¶ Caso di Gangrena Secca con Autopsia Cadaverica del Prof. Linoli, negli Annali Universali di Medicina, compilati da Annibale Anadeli, t. lxxiv, p. 469.

** Leçons Orales de Clinique Chirurgicale publiées, par Pavillon et Jean-selme. Ed. Bruxelles. p. 690-91.