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President of the Ulster Medical Society 1933–34

Presidential Opening Address
Ulster Medical Society

THE EPIDEMIOLOGY OF ENTERIC FEVERS IN NORTHERN IRELAND

Ladies and Gentlemen, Let me begin by thanking you for your kindness in electing me to the position of president of the Ulster Medical Society for the session 1933-4. It is an honour which 1 greatly appreciate and of which I am very proud.

When I consider the names of the men who have held this position since 1906, when I became a member of the Society, and that distinguished line extending back to 1862, I feel elated to be admitted to their company, and shall try to emulate their example, and hope that in the discharge of my duties I shall not dishonour the trust you have reposed in me.

My next duty is to refer to the loss the Society has sustained during the past year in the death of four of its Fellows. I had the privilege of enjoying the friendship of all of them. The Society and the community are much poorer since their passing.

Dr. Hugh William Bailie obtained his medical qualifications in Edinburgh in 1888, and for many years had an extensive practice in Belfast. In 1905 he obtained the D.P.H. of the Royal College in Dublin, and soon after was appointed Superintendent Medical Officer of Health of Belfast. He had, at the start, to reorganize the Public Health Department, and did it so efficiently that it has required little alteration, but only slight extension, by his successor. The improvement of the public health of Belfast during his twenty years' service, was in no small measure due to the work of his Department, and is to him a worthy memorial. For many years Dr. Bailie was Lecturer in Public Health Administration and Examiner for the Diploma in Public Health at Queen's University. Dr. Bailie was a modest, unassuming man, but those who knew him found him a loyal and helpful friend.

Dr. John Tate Creery was one of the oldest of our members, having obtained the M.B. degree of Dublin University in 1880. He had an extensive practice in Coleraine, where he was also District Dispensary doctor and medical officer to the Royal Academical Institution. In spite of the long journey involved, he

was a frequent attender at the meetings of the Society, and enjoyed the respect and affection of the whole medical profession.

Dr. Richard McCulloch was cut off in the flower of his life, but already he had made a position for himself as an authority on chest radiography. He obtained the M.B. degree of Queen's University in 1912 and the D.P.H. in 1915. For a considerable number of years he was Assistant Tuberculosis Officer to the Belfast Corporation, but eventually set up as a consultant, specializing in diseases of the chest. His X-ray photographs were, I am told, of extraordinary merit, and he seemed destined to occupy a commanding position in his speciality. He was medical officer in charge of the Radiological Department of the Belfast Hospital for Sick Children. A paper entitled "The Use of X-ray in the Diagnosis of Pulmonary Tuberculosis" appeared in the October number, 1932, of THE ULSTER MEDICAL JOURNAL. He had suffered from nephritis for

many years, but in spite of his disability he was always cheerful and had always a kindly word and a smile upon his lips. He was a delightful after-dinner speaker, and told a story in an inimitable manner.

Dr. James Colville's passing leaves a blank which it will take years to fill. We shall miss his kindly presence and his genial and whimsical remarks. His medical colleagues held him in honour, and his numerous patients in Belfast mourn the loss of not only "a beloved physician," but of a dear friend, always a help and support in time of trouble. Dr. Colville had a distinguished academic career, obtaining the B.A. of the Royal University in 1888 and the M.B. and M.D. degrees of the same university in 1893 and 1895. In 1893 he became a Life Fellow of this Society, and was its president in the session 1918-9. Dr. Colville, jointly with Dr. Donnan, published in the "British Medical Journal" in 1898 a paper entitled "Examination of One Hundred Cases of Typhoid Fever by Widal Serum Test." The poor of the city have lost a great benefactor, since to the hospitals Dr. Colville gave ungrudgingly of his skill, and with it kindness and encouragement. He was for a time registrar to the Royal Victoria Hospital, and for many years honorary physician to the Ulster Hospital for Children and Women, and physician to the Belfast Hospital for Sick Children.

To these four names I, on your behalf, and on my own, would like to pay this brief tribute of respect.

The subject which I have chosen for my address illustrates the importance of preventive medicine, an aspect of our work as doctors which is not only concerned with checking the spread of disease, but with the removal of the conditions which allow of its occurrence. In these islands, knowledge of the means to control outbreaks of enteric fever had been obtained and to a great extent acted upon before the specific bacilli had been isolated.

Budd (1856) recognized that the living poison of the disease was present in the stools of the patient, and that the disease was mainly acquired through the consumption of water, milk, and vegetables contaminated with such excreta. The measures which would reduce the occurrence of the disease were those which would secure pure water supplies from clean catchment areas or from pure wells, and provide drains and sewers to remove filth rapidly from the premises. Abolition of privy middens and cesspools followed. The control of typhoid was brought about by the water engineer and town surveyor following the advice of the clinician. The bacteriologist at first had no part, since many decades elapsed before the typhoid bacillus was cultivated by Gaffky in 1884. The Public Health Act of 1875 – an Act in which many previous Acts were consolidated contained provisions which, if enforced, would have materially reduced the incidence of typhoid fever. The measures – good housing, good drainage, pure water supplies were expensive but lasting, and were useful for the eradication of many other diseases. It was probably an advantage that bacteriology developed later than sanitary engineering, as it is possible that active immunization might have been advocated as being cheaper than the great public health schemes which were undertaken.

In making this statement I do not wish to disparage bacteriology, the study of which has added much to our knowledge of the etiology of enteric fevers, assisting in their diagnosis and calling attention to the part played by the "carrier" in their dissemination. It has also shown that enteric fever is not invariably due to infection with the B. typhosus, but also to infection with B. paratyphosus B, B. paratyphosus A, B. paratyphosus C, and occasionally to other organisms.

Since the war an increasing number of the cases of enteric fever are due to infection with B. paratyphosus B. From my experience in examining blood and stools of suspected cases, my impression is that about fifty per cent, of the cases in the counties of Northern Ireland are due to infection with para. B.

From Dr. C. S. Thomson's Report on the Health of the County Borough of Belfast for 1931 I find that of forty-five cases of enteric treated at Purdysburn Hospital, twelve were infected with B. typhosus, and thirty-three with B. paratyphosus B.

Mortality from Enteric Fever.

When the records of mortality in these islands are studied, one of the most gratifying facts that emerges is the great decrease in mortality from enteric fever that commenced at the beginning of the present century and has continued up to the present time. In the seventies of the last century the enteric mortality-rate in Great Britain was more than double that of Ireland. In 1875 the rates per ten thousand of the population were, for Scotland, England, and Ireland, 4.6, 3.7, and 1.6 respectively. From 1875 till 1886 there was a decline in the rate in Great Britain, but practically no change in Ireland during this period. In 1886 the rates for Scotland, England, and Ireland were 1.9, 1.8, and 1.6. The rates in Great Britain remained more or less stationary until 1899, when a decline occurred in all three countries, being preceded in 1897 and 1898 by a very steep ascent in

Ireland, mainly due to severe epidemics in Belfast. From 1900 there has been a fairly steady decline, but more pronounced in Great Britain than in Ireland. In 1924 0.10, 0.13, and 0.31 were the rates for Scotland, England, and Ireland. In 1931 the rates per ten thousand were – in Northern Ireland 0.12, in the Irish Free State 0.23, and in England and Wales 0.06.

In Belfast, up to 1909, the mortality-rate from enteric fever was comparatively high. In the seventies, eighties, and nineties the rate per ten thousand averaged 6.7, 5, and 7.3 respectively, and for the first ten years of the present century it was 3.5. Since 1910, when it was 0.5, there has been a gradual decline, the figures for the quinquennia 1912-6, 1917-21, 1922-6, and 1927-31 being 0.5, 0.6, 0.2, and 0.1.

Perhaps the position will be more readily appreciated when it is stated that in 1898 the deaths from enteric fever in Belfast were 640, and that in 1931 the number was one.

In connection with the epidemiology of enteric fever in Northern Ireland, the greatest problem is to explain the enormous number of cases which occurred in Belfast up to 1905, and the steady and rapid decline which has prevailed during the past twenty-five years.

In 1907 the Irish Local Government Board appointed five sanitary experts to form a commission and hold an inquiry into the cause of the high death-rate in Belfast, and in connection with this work Dr. L. W. Darra Mair wrote a special report on enteric fever in Belfast, and in 1909 he communicated to the Epidemiological Section of the Royal Society of Medicine a paper on "The Etiology of Enteric Fever in Belfast in Relation to Water Supply, Sanitary Circumstances, and Shellfish." The Commission concluded that the water supply was not responsible for the epidemic prevalence. The main reasons for this opinion were (1) That the outbreaks in Belfast were not of an "explosive" nature; (2) that the cases had no relationship to the distribution of any of the three different water supplies to the city; (3) that the fever was mainly limited to the quarters of the city occupied by the working classes.

Mair did not consider the general sanitary condition of Belfast worse than that of most of the other towns and cities in the United Kingdom. He stated that although there had been and still were many serious sanitary shortcomings in Belfast, and the system of scavenging of privies and ashpits even then was exceedingly defective, it could not be contended that in a sanitary sense Belfast was on an altogether lower level than other cities and towns in the United Kingdom. In fact, there could be no doubt that in some respects the evidence pointed the other way. Belfast (he said) was a town of rapid modern development – that is to say, it was a new town – consisting largely of wide streets lined by rows of comparatively modern dwellings, the vast majority of which were self-contained, so that there was an almost complete absence of antiquated courts, alleys, and common-yards, such as might be seen in Dublin and Cork and also in many of the older seaport towns in England and Wales.

Mair concluded that the extraordinary incidence of enteric fever in Belfast could not be attributed to infected water or to insanitary conditions, though the latter no doubt contributed, but that the consumption of shellfish collected from the polluted foreshore of Belfast Lough was a hypothesis which fitted best with all the epidemiological facts.

In a paper which I read before the Royal Society of Medicine in 1926, I stated that no doubt a considerable amount of enteric fever which had occurred in Belfast had been due to the consumption of contaminated cockles and mussels, but I was very doubtful whether the extraordinary decrease which had occurred in recent years was due to a complete change in the habits of the population. I pointed out that amongst 83, 151, 106, 51, and 117 cases of enteric fever occurring in Belfast in the years 1909, 1913, 1914, 1915, and 1921, a history of recent consumption of shellfish was obtained in 1, 15, 15, 2, and 6 instances respectively. Shellfish was therefore a possible source of infection in 39 out of 508, i.e., in 7.6 per cent, of the cases.

It was my opinion that the decrease was to be attributed to the abolition of privies and the substitution of ashbins for ashpits, the improved scavenging, the abatement of nuisances, the decrease of stables and byres and their concomitant flies, the more effective sanitary administration, the isolation of cases in hospital, the higher standard of living and of education, and the growth of a sanitary conscience.

I showed that in 1897 the number of houses with privies was 26,620 out of a total of 67,479; in 1902 the numbers had become 10,000 and 77,788, whilst in 1908 there were only 2,000 privies remaining; that in recent years practically all privies had been converted under the Belfast Corporation Act of 1899.

Mair appreciated that there were facts which his hypothesis did not explain, and that he realized that the rapid growth of the city might have been a factor in the great prevalence of the disease, would appear from the following statement: "It is possible that the diminution of fever which marked the first two years

after 1901 may have preceded somewhat any very great reduction in the consumption of shellfish. The point was difficult to establish with exactitude. The question arises, however, whether the earlier diminution of fever may not have been due in part to exhaustion of susceptible material among the population. It is a fact that about this time the Belfast population was not increasing at anything like the same rate as previously; indeed, it is probable that in 1901 and 1902 the population diminished somewhat. With this relative stagnation of the population, the enormous incidence of fever during the critical period of five years – there had been a total of nearly nineteen thousand cases, or about five per cent, of the population – suggests that for a time insusceptibility might have been a not unimportant factor in effecting a diminution of fever."

The work of Topley and Greenwood and their colleagues has demonstrated, in connection with mouse typhoid, the great influence effected on an epidemic by the immigration of susceptible individuals into the cages. Topley states: "When the pre-epidemic stage has been passed, and a definite epidemic prevalence of the disease has been established, the future course of events is largely determined by the rate of immigration of susceptible hosts. If no such immigration occur, the epidemic gradually dies down, leaving a varying number of survivors."

In connection with enteric fever in Belfast, it is perhaps not without significance that the highest mortality prevailed during the periods of most rapid expansion. The increase of population was due not merely to an excess of births over deaths, but to an immigration (1) from rural areas of large numbers of individuals and families; and (2) from Scotland of many shipyard workers and their families. The areas which were most infected were those in which the shipyard and factory workers mainly resided. The growth of Belfast during the fifty years between 1851 and 1901 was remarkably rapid, the population at the end of that period being quadrupled.

Whilst the factors concerned in causing the great epidemics of typhoid fever in Belfast towards the end of the last century must remain obscure, it must be conceded that for the past twenty-five years every outbreak has been well investigated, and in most instances the source of infection has been discovered. This has been due to the putting into operation of the Infectious Diseases Notification Act and the co-operation of the medical practitioners with the Public Health Department. The Corporation of Belfast, and in particular its Public Health Committee, guided by chairmen like Alderman Dr. Williamson and the late Dr. King Kerr, deserves the gratitude of all citizens for the work which has been accomplished. Much assistance has also been given by the Medical Inspectors of the Central Departments of Government, and lastly, by the new light that bacteriology has thrown on the subject. As a result of Koch's work in Southern Germany, the importance of contact infection and of the part played by the "carrier" has been demonstrated.

It is interesting to note that Sir Thomas Houston in 1899 discovered the first chronic carrier of the B. typhosus. This was a case of cystitis due to infection with the bacillus. With the establishment of a Department of Pathology and Bacteriology at the Queen's College, a great impetus was given to the investigation of typhoid fever. Professors Lorrain Smith and W. St. Clair Symmers not only assisted in these investigations, but inspired many practitioners with the new knowledge.

In consequence, bacteriologists were available to assist the clinician, the medical officer of health, and the medical inspector in the investigation of any outbreak of the disease. I could record instances where "carriers" were discovered by T. Houston, N. C. Graham, S. Barron, G. F. W. Tinsdale, and others. Accounts of these outbreaks which have been published elsewhere were most instructive and most interesting, but time prevents my dwelling upon them. I could draw on the reports of the medical inspectors of the old Local Government Board and of the present Ministry of Home Affairs and of the Superintendent Medical Officer of Health of Belfast, for material to fill a dozen papers, but I trust that Doctors Patrick, McCloy, and Thomson will pardon me for refraining.

I shall give again a short account of an epidemic in which the late Dr. Brian O'Brien – a name dear to many of the older members of the Society – carried out an investigation, and in which I assisted in the bacteriological work.

This was a milk-borne epidemic which occurred at the latter end of December, 1910. The scene of the outbreak was a small village, D_v, consisting of one hundred and thirty houses, and with a population of eight hundred, practically all employees of a large weaving factory. The houses were modern and the majority possessed water-closets. The first case was notified on 24th December, 1910; the second case was that of the driver of the milk-cart, who was medically examined on 22nd December and sent to bed, a diagnosis of enteric fever being made on 27th December. The Medical Officer of Health, Dr. Frier,

and Dr. Boucher, had already on 25th December stopped the milk supply; in fact, that day's supply was only partially consumed, as the dairyman, Mr. H_, went round to his customers who had got their morning supply and urged them to destroy it, as it was probably infected. I think this action on the part of a dairyman whose milk is under suspicion is unique, and it is sad to relate that he himself later developed the disease and died. There were thirty-six cases in all, twenty-five being in the village of D_y, eight at M_n, a small collection of houses half a mile from the village, and three at the milkman's house, situated two miles from D_y. The one factor common to all was the milk supply. The source of infection proved to be a servant girl who came to the farm on 15th November, 1910. This girl had an attack of enteric fever in December, 1908, and, curious to note, she was infected by a former mistress who was a "carrier," and who as a landlady of a small hotel had infected several of her guests. In 1910 another employer of this girl had enteric fever. Typhoid bacilli in large numbers were found in her stools, and though she was treated in hospital for many months with vaccines, intestinal antiseptics, etc., she remained a "carrier."

Another outbreak traced to a "carrier" which occurred recently in a mental hospital presents some points of interest. Dr. Weir has supplied me with the main facts, and I have his permission to mention them in this address.

In March, 1932, one case of typhoid fever occurred in the hospital, and three cases in the following July. No further cases occurred until March, 1933, when there were five cases, and then five more in April. On the 1st April an inmate of the institution who handled the milk was found by me to be a faecal "carrier." B. L. was a man of twenty-eight years of age who was admitted to the institution in May, 1931. No history of his having previously suffered from typhoid fever could be obtained, although on 1st April, 1933, his stools contained enormous numbers of B typhosi, his blood was negative to the Widal test. The interesting point is that this "carrier" in August, 1933, developed a typical attack of typhoid fever, i.e., over four months after the time he was discovered to be a "carrier." When and how he became a "carrier" cannot be ascertained.

Why did this man not develop the disease within the usual incubation period? If we could answer this question, immunity would not be so full of mystery.

At one time the difficult problem in connection with the etiology of typhoid fever was to show that it was possible for the patient to have had the opportunity of swallowing typhoid bacilli. The problem to-day is to explain why any person escapes an attack of this disease.

Improvements in bacteriological methods have facilitated the isolation of enteric bacilli, and it has been shown that these micro-organisms are very frequently present not only in the human intestine, but in the sewage of institutions and of towns. In a recent paper in the "British Medical Journal" I give references to numerous reports on the isolation of B. typhosus from sewage and water, which have been published since 1928, when by means of a new medium developed in my department, typhoid bacilli were first cultivated from sewage and shellfish.

In Belfast sewage a typhoid or a paratyphoid bacillus is usually present in 1 c.c.

In his report for 1931, Sir Alexander Houston of the Metropolitan Water Board gives the results of the weekly examination of the sewage of Epping following an outbreak of paratyphoid fever in this area. On one occasion he found as many as 2,880 B. para. B in 1 c.c. of the sewage, and 355 in the effluent. He calculated that on 18th February, 1931, over thirty-three thousand million paratyphoid bacilli were being discharged daily into Cobbins Brook, a tributary of the Lee.

Besides typhoid and paratyphoid bacilli, various food-poisoning organisms have been found in sewage, and Scott has found these organisms not infrequently in duck eggs.

It is seldom that the B. typhosus has been isolated from a water supply, but on 26th May, 1932, by means of the Wilson and Blair medium, I succeeded in cultivating the germ from a sample of water taken from a stream. Along the course of the stream cases of typhoid had occurred. The water sample was found to contain on an average, in every 3 c.c., one typhoid bacillus, two B. welchii, and thirty B. coli. I have reason to believe that the bacilli were derived from the faeces of a "carrier."

The problem of how to deal with the chronic "carrier" presents great difficulties to the medical officer of health. To prove that a suspected person is a "carrier" it is necessary to cultivate the infective agent from his excreta. There is, however, no statutory obligation on a suspected "carrier" to submit specimens for bacteriological examination unless he be engaged in dairy work, and even then it is very probable, unless he has been removed to hospital, that the specimens of excreta supplied for examination do not come from the body of the suspected individual.

Dr. Armstrong, a Oueensman who is County

Bacteriologist for Dumfries, made in 1932, for Dr. Ritchie, the County Medical Officer, five examinations of the stools of a woman who had been proved a "carrier" in 1926. All were negative, but at the same time typhoid bacilli were cultivated from the cesspool which took the drainage from her cottage!

Fortunately, the great majority of "carriers" never, under good sanitary conditions, convey the disease, but in the case of a "carrier" who has been connected with an outbreak of the disease, what can the medical officer of health do to protect the community? He can, on paper, prohibit him or her from following an occupation involving the handling of milk and food. But here, as elsewhere, prohibition has not been a complete success!

From this review of the position of enteric fever in Northern Ireland, one may claim that the sanitary authorities, central and local, have won a great victory. The enemy has been defeated and driven underground, but, given the opportunity, he is ready to take the field again. One may ask, What of the future? What practicable measures might be taken to prevent sporadic outbreaks? I would continue to enforce the various Acts that would secure pure water, pure air, and clean soil, and then improve the housing of the working classes and abolish slums; chlorinate all shellfish in the manner in which this is effected at Conway, and, recognizing that in recent years milk and cream play an important part as vehicles of infection, I would urge on the Government the necessity for all milk and milk products to be efficiently pasteurized and hygienically distributed. The latter measure would also help to reduce the incidence and mortality from surgical tuberculosis, and prevent milk-borne outbreaks of scarlet fever, diphtheria, and undulant fever.