

hospital. This decision would be hastened by a history of previous resistant attacks. On admission attention must first be directed towards relief of bronchial spasm.

Adrenaline when used "in adequate dosage" must still be considered the most effective bronchodilator. It should be stressed that many allegedly resistant cases have been shown to be due to too small a dose. In the absence of obvious cardiovascular contraindications we would recommend the immediate injection of 20 minims (1.2 ml.) of 1:1,000 adrenaline hydrochloride as advised by Herxheimer, and used by one of us (C. K. R.) Where contraindications exist 0.25 g. of theophylline with ethylenediamine may be given intravenously.

For the severe, acute, cyanosed asthmatic sufferer from anoxic anoxaemia the early use of oxygen/carbon-dioxide mixture 95.5% is obviously indicated at a rate of 6 litres a minute. This mixture is used in preference to pure oxygen as the carbon dioxide helps to prevent the onset of apnoea and has an expectorant action (Basch *et al.*, 1941).

While one cannot condemn the use of morphine in status asthmaticus too strongly, because of its central depressant action on a respiration already barely adequate, these patients are as a rule fatigued and apprehensive, and benefit from the safe sedation produced by phenobarbitone sodium, 3 gr. (0.2 g.) intramuscularly.

Mucous plugging has been stressed throughout this paper, as it has apparently often contributed to the death of the patient. Potassium iodide renders sputum less viscid and thus easier to expectorate. It should therefore be given as soon as possible, in the form of Lugol's solution, 10 minims (0.6 ml.) three times a day.

Cortisone and A.C.T.H. are accepted as powerful anti-allergic agents and can be used in attacks resistant to the scheme of treatment outlined above. These drugs encourage fluid retention, however, and this should be borne in mind if there is any sign of cardiac failure.

In the asthmatic patient with an infective sputum penicillin should be given in anticipation of bacteriological results.

Summary

The relevant literature on bronchial asthma is briefly reviewed. Eighteen cases of fatal asthma are recorded, with clinical and pathological findings. Thirteen deaths were sudden and unexpected.

Possible immediate causes of death are discussed.

Treatment is considered.

We wish to thank Dr. Robertson Ogilvie and the staff of the Pathology Department of the University of Edinburgh for valuable co-operation. We are indebted to the physicians of the Royal Infirmary, Edinburgh, and associated hospitals for access to case records.

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CHRONIC BRONCHITIS IN GENERAL PRACTICE

BY

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General Practitioner

Diseases which are commonly encountered in hospital practice are not necessarily the most important from the point of view of national health and personal suffering. In considering disease from these aspects we must have regard to (a) its total incidence; (b) its average duration; (c) the types of persons affected and the period of life at which it produces its effects—thus a disease during the working years is of more national economic significance than one affecting the retired age groups; (d) the loss of time from work which it causes; (e) its mortality; (f) its preventability; and, above all, (g) the suffering which the victim undergoes. The most important national diseases, with regard to these factors, are the infections of the upper and lower respiratory tracts, the nervous and mental disorders, acute and chronic rheumatic manifestations, tuberculosis, and disorders of the digestive and cardiovascular systems.

As a distinct clinical entity, chronic bronchitis is one of the most important of diseases in this group—both numerically and socially. It is only in general practice that it is seen in all its stages and in all the effects it produces on the individual and the family group. In hospitals the condition is encountered only when the patient is referred there by the general practitioner, and this is usually only for diagnostic purposes—x-ray examination and sputum analysis—during an acute exacerbation and during the late stages with cor pulmonale.

Chronic bronchitis is in some degree responsible for over 30,000 deaths annually in Great Britain. It has been estimated to account for the loss of some 16½ million working days a year (Report of Ministry of National Insurance, 1950), and this does not include the condition as it affects the housewives, who, although an important and essential working group, do not receive insurance benefits. In general practice it accounts for a large volume of work. In my own practice in S.E. London it was in 1952 responsible for some 8% of all attendances, while Pemberton (1949), in Sheffield, estimated that it accounted for some 11% of all attendances. Proportions are probably higher still in some north-west areas of England.

The condition produces serious disablement—the Disabled Persons Register (*Ministry of Labour Gazette*, May, 1950) lists 7.9% of its total as being disabled on account of "non-tuberculous disease" of the lungs, of which chronic bronchitis constituted the largest proportion. The Treasury Deputy Medical Adviser's Report for the G.P.O. for 1951 shows that chronic bronchitis was responsible for 15% of all retirements on health grounds.

Other factors which make the disease one of such major national importance are its long duration, often causing trouble for 25 to 30 years, and the fact that each winter it causes a considerable loss of worktime. In addition, it affects principally middle-aged men in their most active and able years, which makes the absence from work of even greater significance. The fact that it is probably largely a preventable condition adds to its

importance and introduces an urgent and imperative need for further researches and actions in this field.

What is "Chronic Bronchitis"?

Having glibly talked of "chronic bronchitis," implying it to be a specific and distinct clinical entity, I must attempt to define the condition before proceeding further. Almost certainly what we now know, or think we know, as "chronic bronchitis" consists of a number of separate but allied conditions, and it is necessary to separate these clinically and to seek out their different causes before we can proceed to its rational and satisfactory management.

For the purposes of this paper the term has been used to depict a chronic condition as seen in patients who have been under my care for some years and in whom the chief features are an irritating and recurring productive cough with variable amounts of sputum, to which some degree of dyspnoea is usually superadded. These patients have at some time during the course of the illness had their chests x-rayed to exclude such conditions as tuberculosis, neoplasms, pneumoconiosis, etc. Cases of asthma and bronchiectasis have been excluded from this series.

A survey is made of a series of 127 cases of chronic bronchitis, using the term in a broad sense, seen in my practice. It is most important to stress this, for the results and observations can by no means be taken to represent the state of affairs in the country as a whole, but perhaps it might show the need for, and the possibilities of, a nationwide investigation.

The Condition as Seen in General Practice

Before discussing the disease it is essential to know something of the population at risk and the area in which they live. The practice is situated on the south-eastern outskirts of London and is typically suburban. The patients, numbering 4,500, are principally in social classes 3 and 4, being employed either in local light industry or in clerical and administrative duties in London, which is some 10 miles distant. The age distribution includes the usual proportions of all ages (Table I). The climate is that common to the

TABLE I.—Numbers at Risk in Age Groups

Age	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+
No. ..	663	466	670	790	780	550	370	208

British Isles. This area has its share of temperature changes in winter and summer, and is also liable to have severe winter and autumnal fogs. Atmospheric pollution is probably not excessive, but, while there are no large industrial concerns, each house—and these are all of the simple semi-detached three-bedroom variety—burns at least one fire almost continually during the winter.

For the purposes of this survey a note has been kept over the past few years of all patients thought to be suffering from chronic bronchitis; the report is a retrospective one covering in detail the year 1952, which in some ways was an abnormal one, as it included a severe and persistent fog.

In September, 1952, there were 127 chronic bronchitics in the practice, five of whom died during the following 12 months. This gives an incidence of 28 per 1,000. On these figures there might be some 1½ million such patients in the British Isles at the present time.

Sex Distribution.—There were 71 males and 56 females. Although there is a slight male preponderance, it is not nearly so marked as that quoted by Oswald *et al.* (1953) and Goodman *et al.* (1953). The former had an 8:1 male predominance and the latter had a mortality from chronic bronchitis of four males to one female. The actual numbers in the different age groups and the rates per 1,000 of the practice's population are given in Table II. The incidence

TABLE II.—Age Distribution of Chronic Bronchitis and Rates Per 1,000

Sex	Under 40		40-49		50-59		60-69		70+	
	No.	%/100	No.	%/100	No.	%/100	No.	%/100	No.	%/100
Males	7	7	12	30	20	67	27	142	12	125
Females	7	7	7	19	13	52	16	90	13	127

is seen to rise with age, especially when the true rates per 1,000 are studied, and here, too, can be seen the definite male preponderance, except in the under 40 and the 70+ groups, but this may be peculiar to the practice.

Social Classes.—As already stated, the practice consists principally of social classes 3 and 4, and the chronic bronchitics show roughly the following distribution:

Social Class:	1	2	3	4	5
Males	35	30
Females	1	30	20

Goodman *et al.* (1953) showed that the mortality from chronic bronchitis increased inversely with the social groups, but their figures were for 1931. Oswald *et al.* (1953), however, found that the distribution of chronic bronchitis was parallel to that of the controls. It cannot be concluded, therefore, that the condition is one of the lower social groups.

The duration of the condition is shown in Table III.

TABLE III.—Duration of Condition (Years)

	Less than 5	5-9	10-19	20+
Males	6	13	30	22
Females	9	12	17	18

The age of onset was usually between 30 and 60 (Table IV).

TABLE IV.—Age of Onset

	Under-20	20-29	30-39	40-49	50-59	60-69	70+
Males	1	5	16	16	28	5	—
Females	2	9	9	19	12	5	—

The personal habits of the patients may possibly have a bearing on the condition, and some attempt has been made to examine these. Most of them had always resided in London and its environs.

Tobacco smoking has recently been prominent as a possible cause of carcinoma of the bronchus, and it must also be considered in chronic bronchitis. No real differences were found between the smoking habits of the chronic bronchitics and those in a series of controls of similar age and sex distribution (Table V). Oswald *et al.* (1953), on the

TABLE V.—Smoking Habits of Chronic Bronchitics Compared With a Series of Controls

		Consumption of Tobacco		
		Non-smokers	Under 20 Cigarettes a Day	20+ Cigarettes a Day
Males	Chronic bronchitic	10	36	25
	Control	11	38	22
Females	Chronic bronchitic	22	19	15
	Control	30	21	5

other hand, found a significant difference: 9% of non-smokers among the chronic bronchitics and 20% among the controls.

There was no evidence of alcohol being a causal factor, nor were there any significant occupational hazards.

A family history of chest disease was rather difficult to ascertain accurately, but it was thought to be significant in some 47 instances (25 men and 22 women).

Extent of Morbidity

Some 25% of all attendances in general practice are for conditions of the respiratory tract. Most of these are on account of minor upper respiratory affections such as the common cold and its complications. In 1952, in my practice, this group of upper respiratory infections accounted for some 60% of attendances for respiratory conditions. Chronic bronchitis was responsible for 25% of the total respiratory attendances (over 1,000), representing 8% of all the attendances during the whole year.

These attendances for chronic bronchitis showed a rise with age corresponding to the age incidence of the condition, and again there was little difference in the sexes. As would be expected, there was a marked seasonal variation, the attendances for chronic bronchitis being *six times more* in December than in August. Almost a third of these patients had to have more than one month away from work during the year, and the majority of them were men (Table VI). It is common knowledge that the housewife cannot afford as much time for illness as her husband.

TABLE VI.—Duration of Sickness in Chronic Bronchitis Over One Year

		Incapacity Time		
		Nil	Less than 1 Month	More than 1 Month
Male	26	15	30
Female	30	16	10

Clinical Features

Difficulties in connexion with the diagnosis and conception of the disease are partly due to the fact that a number of other conditions have very similar clinical features which require differentiation.

Asthma, as a diagnosis, should be reserved for cases which are characterized by sudden and limited bouts of dyspnoea with signs of bronchospasm and in which, at least in the early stages, cough and sputum are not prominent. The late stages of asthma, on the other hand, can present a picture identical to that of chronic bronchitis, with severe productive cough, dyspnoea, and the barrel-chest deformity and heart failure. *Pulmonary tuberculosis*, especially in elderly men, can present clinical features like those of chronic bronchitis, and can be excluded only by chest x-ray examination and sputum analysis for tubercle bacilli; these investigations should therefore be carried out in all chronic bronchitics. The various types of *fibrosis of the lungs*, both occupational and others, can also present similar features, and here again radiological differentiation is necessary. *Congestive heart failure* at times presents difficulty when a productive cough is a prominent symptom.

Clinically, chronic bronchitis is a condition with few symptoms and signs. It is characterized by a productive cough—at first present only in the winter months and usually worse in the morning and evening—and dyspnoea, which varies both in degree and in duration. The course of the condition is often punctuated by acute exacerbations with severe local and systemic disturbances. The signs are merely those resulting from the presence of secretions in, and obstruction of, the bronchial tubes—namely, rhonchi and rales. In the later stages non-specific structural changes take place and produce the barrel chest and emphysema.

There are no specific diagnostic tests. Chest radiography shows little abnormality in the early stages and only features of non-specific emphysema later, but it should be carried out to exclude other conditions already mentioned. Sputum analyses have not been found of any real value in either diagnosis or treatment.

Closer study of any large group of chronic bronchitics will reveal certain grades of severity, and it is of value to define and describe them.

The *onset* itself is variable; usually it is slow and insidious, with a productive winter cough, increasing in severity year by year; but in some, particularly the more elderly patients, it may be sudden, often following a pneumonia; in others there may be no apparent cause.

Case History.—A fit groundsman aged 58 had never suffered from a cough until the influenza epidemic in 1951, when he contracted pneumonia, which was complicated by severe bilateral lobar pneumonia. Since then he has had a persistent cough with much sputum and dyspnoea. The chest skiagram is not abnormal and bronchography reveals no bronchiectasis.

Grading

It must be realized that the following grading does not necessarily imply that the condition is a progressive one from one grade to the next. It can remain stationary at one level without any deterioration. The distribution is shown in Table VII.

TABLE VII.—Distribution of Different Grades of Chronic Bronchitis in the Two Sexes

	Males		Females		Total	
	No.	%	No.	%	No.	%
1. Winter cough	26	36	15	27	41	33
2. Winter cough and acute exacerbations	13	19	17	30	30	25
3. Symptoms all year round	20	28	19	34	39	30
4. Complete invalid	12	17	5	9	17	12
	71	100	56	100	127	100

1. *Winter Cough*.—The least troublesome form of chronic bronchitis is that which is characterized merely by a recurrent winter cough. There are usually no abnormal physical signs. The sputum varies in quantity and appearance—most often being mucopurulent. The symptoms usually begin in October or November, following a cold which “goes to the chest,” and persist until about April. In the present series this form represented 33% of the total, being slightly more common in males.

2. *Winter Cough and Acute Exacerbations*.—The next group is those patients with the winter cough who, in addition, are liable to have acute exacerbations. This complication occurs as a sudden deterioration in the chronic state with urgent dyspnoea and severe systemic upset—but there are various degrees of severity. Some cyanosis is usually apparent and there is a distressed wheezing respiration. The pulse is rapid and full, and the temperature may vary from subnormal to a high fever. Examination of the chest most commonly reveals restricted movements and suppressed breath sounds with added rhonchi and rales. There is no evidence of any consolidation, either clinically or radiologically. The exact cause of this serious and common complication is unknown, but it seems to be the result of an acute superadded condition affecting the bronchial and bronchiolar mucosa in a subject with an already defective respiratory apparatus. It is suggested that the infection in some way disturbs the distribution of the pulmonary blood flow (*Lancet*, 1953). This condition was particularly common during the severe fog of December, 1952.

3. *Symptoms All the Year Round*.—Patients with these symptoms constitute the next group. By the time this stage is reached—and it accounts for some 30% of all the cases—the patient is becoming increasingly dyspnoeic and disabled. Although the productive cough is present all the year the symptoms are worse in the winter, and at this time, too, the course is apt to be complicated by the acute exacerbation already discussed. Each such attack leaves the victim more disabled, and the condition eventually merges into the next grade.

4. *Complete Invalidism*.—This group, which fortunately accounted for only some 12% of the total, presents a distressing and pathetic picture. It is more common in men and is the stage of respiratory and cardiac failure. Dyspnoea is severe; the cough is extremely irritating and

disturbing, and is associated with the expectoration of a large volume of purulent and mucopurulent sputum. There is a profound accompanying general systemic upset with loss of weight and appetite, lack of sleep, headaches, nausea and vomiting; and eventually death occurs, either from cor pulmonale or during an acute exacerbation.

Management

It is the general practitioner who has the task of caring for these patients in all their stages. For they are seen in hospital practice only when the diagnosis is being considered and when some special forms of treatment and special nursing are necessary. At all other times the G.P. is responsible for the physical and moral care of these cases, and it should be stressed that the latter aspect of treatment is a most important one. "Sympathetic encouragement" is an absolute essential in management. It should be stressed that treatment cannot be applied rationally, but only empirically, on account of our lack of knowledge of the causes, but these empirical measures can help our patients considerably.

General advice on the best type of occupation and on ways of improving living conditions and the removal or correction of any aggravating factors can be of great value. Breathing exercises are important in maintaining good respiratory movements.

Relief of the cough is a most difficult problem. Although the scientific value of expectorants and linctuses is doubted, our patients invariably tell us what relief they have had from our favourite mixtures. Postural drainage should be encouraged night and morning, and is often of much value.

Bronchospasm and dyspnoea are sometimes helped by antispasmodics such as ephedrine, isoprenaline, and others—either by mouth or as sprays. It is important that the acute exacerbations be treated energetically, with antibiotics and oxygen, when necessary, in order to prevent any deterioration in the already poor pulmonary reserves.

It is wrong to pretend that we can influence the natural course of the condition, with the exception of the acute exacerbations, and it is much more important to endeavour to devise methods of preventing it rather than to seek new forms of therapy for the established state.

Discussion

Before we can prevent the disease we must know more of its causes. In order that we may be able to do this it is essential to study more carefully and thoroughly what is known about the disease and its natural history. We should seek reasons to explain differences in age and sex incidence, and the differing mortality and morbidity rates in the different countries of the world. We must study the possible influences of smoking, climate, atmospheric pollution, and any other factors which may present themselves.

Global Incidence

It is difficult to compare vital statistics from different countries, particularly when they relate to an indefinite condition such as chronic bronchitis. Nevertheless, interesting and useful information is obtainable (W.H.O., 1952). The death rates for "bronchitis" for many countries of the world are given and can be presented as rates per 100,000 of the population.

A difficulty is that this term includes both acute and chronic forms, but this can to a certain extent be overcome by excluding countries where the death rates from bronchitis are greatest in children. This will leave us with figures which, although not necessarily representing the true incidence of deaths from chronic bronchitis, will give roughly comparable figures. Table VIII gives the death rates per 100,000 in various countries. It shows that the death rate is highest in England and Wales, and the term "English disease might well be transferred to chronic bronchitis, which alike appears to be a typical product of English weather and murky towns" (*British Medical Journal*, 1953).

TABLE VIII.—Showing Death Rates Per 100,000 from Bronchitis in Different Countries of the World in 1950

England & Wales	65	S. Africa (White)	15	Chile	7
N. Ireland	47	Italy	15	France	6
Scotland	43	New Zealand	14	Uruguay	6
Spain	35	Australia	12	Sweden	4
Japan	30	Netherlands	11	Canada	4
Belgium	28	Germany	10	Israel	2
Portugal	25	Austria	10	U.S.A.	2
Switzerland	20	Puerto Rico	10	Finland	2
Ceylon	16	Norway	7	Denmark	1

Although these figures require more investigation and confirmation, it can be seen at once that great differences exist between countries with similar degrees of social and economic development. Thus the death rate for England and Wales is 30 times greater than that for U.S.A. and more than twice as much as for more industrialized and more thickly populated Belgium.

Lewis-Faning (1940) compared the seasonal variation in mortality rates between Great Britain and the U.S.A., and found that, whereas the total rates do not differ much over the year, the mortality rates from chronic bronchitis were over 12 times greater in Great Britain during the winter and more than six times greater in the summer.

There are also differences in the rates for different areas in the same country. In this country the death rates are highest in the regions of Newcastle-upon-Tyne, West Riding of Yorkshire, Liverpool, S.E. Lancashire, Birmingham, and South Wales, and there is a definitely increased rate in the urban areas as compared with the rural areas (Goodman, Lane, and Rampling, 1953). Lewis-Faning (1940), however, in his survey of New England, U.S.A., found that the death rate from chronic bronchitis was greatest in the rural areas.

Climate and Atmospheric Pollution

We have only to look back to the fog of December, 1952, to see the effects which cold and atmospheric pollution exert on the mortality from respiratory disease. During this period some 4,500 deaths were directly attributable to this cause. Almost all these deaths occurred in chronic bronchitics over 45. Similar effects were observed in Glasgow in 1925, in the Meuse Valley in 1933, and in Donora, U.S.A., in 1948. In my own practice that fog produced severe effects on some 35% of these chronic bronchitics (Fry, 1953). There is therefore no doubt that atmospheric pollution, as fog, produces serious effects in the chronic bronchitic. It is another matter, however, to deduce that chronic bronchitis is caused directly by atmospheric pollution, but there is strong evidence for this point of view.

The effects of the climate have received all too little attention. Woods (1928) showed that the most extraordinary relationship exists between the fall in temperature and deaths from respiratory disease. Further attention should be paid to the physiological and pathological effects of climate on the respiratory tract.

Conclusions

Chronic bronchitis, accounting as it does for 30,000 deaths annually and for 16½ million days lost from work every year, is indeed a national wasting disease.

It is extraordinary that, whereas the mortality rate from pulmonary tuberculosis has decreased sevenfold in the past 100 years (3.11 per 1,000 in 1847 and 0.47 per 1,000 in 1947), the rate for chronic bronchitis has not altered conspicuously (0.96 per 1,000 in 1847 and 0.75 per 1,000 in 1947) (Daley, 1951). What are the reasons for the mortality remaining at this high level? It may be that the condition is merely a degenerative state which now reflects our ageing population. It may result from an increase in our atmospheric pollution, which, acting in conjunction with our cruel climatic conditions, produces inflammatory changes in the bronchi. It may be the aftermath of certain acute infective conditions such as influenza. It may be connected with our changed smoking habits—although in this series no appreciable difference was noted in chronic bronchitics and controls. All these factors need further inquiry.

We must also explain the differences in mortality rates from chronic bronchitis in the different countries of the world. Why should our mortality rate from this condition be almost 30 times greater than in the U.S.A.? And why should it be more than twice as much as that of Belgium? Obviously there is a great need for further research and inquiry into the causation of and variation in the disease.

This research should be carried out at a number of levels, one of which should be in general practice, for it is here that the true incidence and course can be observed. That this is possible has been proved, and perhaps it should be the first step in a national and possibly world-wide investigation and effort. It is considered by many to be a preventable disease (Lewis-Fanning, 1940; Pemberton, 1952; Joules, 1953a, 1953b). If this is borne out then vigorous steps at the highest levels should be taken to implement the findings.

Summary

The toll from chronic bronchitis includes 30,000 deaths and 16½ million lost days from work annually. In the G.P.O. 15% of all medical retirements are due to this cause. Around 10% of all attendances in general practice are for chronic bronchitis.

It is an indefinite clinical entity, which probably includes a number of separate and distinct clinical conditions.

In a study of a single S.E. London practice 127 chronic bronchitics were diagnosed (incidence of 28 per 1,000) during one year. Males numbered 71 and females 56. The incidence rises with age. No social predisposition was noted. It is indeed a chronic condition. In more than half the cases it had already been present for over 10 years. The commonest age of onset was between 30 and 60. In this particular series there was no difference between the smoking habits of those with chronic bronchitis and controls. A third of the patients were incapacitated from their usual occupation for more than a month during the year.

An attempt has been made to grade the disease into four groups of severity.

At present we have to rely almost entirely on palliative measures in the management of cases. Until its causes are defined and rational steps taken to prevent the condition, little progress can be made.

The most helpful lines of research may be closer studies of the natural course and distribution of the disease. The mortality rate from chronic bronchitis in England and Wales is far and away the highest in the world. It is some 30 times that in the U.S.A. These differences must be more closely examined.

There is a definite relationship between climate and atmospheric pollution and the disease. We have only to note that 4,500 deaths in December, 1952, were directly attributed to fog.

A nation-wide effort is necessary if we are to reduce the wasteful, and possibly unnecessary, effects of the disease.

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SALMONELLA DUBLIN OSTEOMYELITIS OF THE SPINE

REPORT OF A FATAL CASE

BY

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Bone and joint infections due to the food-poisoning salmonellae have been recorded much less often than have typhoid and paratyphoid infections. Ramon Guerra (1940), in his review of the literature on this subject, found 15 authentic cases of salmonella bone or joint infections during the period 1926–38. Thirteen of these were due to *Salm. supestifer* and two to *Salm. breslau* (one of the two was a mixed infection with *Streptococcus haemolyticus*). Reports of *Salm. typhimurium* osteomyelitis were published by Stevenson (1938) and Krauss (1947). Vinke and Downing (1947), in their report of a case of *Salm. montevideo* infection of the knee-joint in an infant aged 6 months, state that in the 17 known outbreaks of *Salm. montevideo* infection in the U.S.A. this was the only reported instance of knee-joint involvement.

Salm. dublin, although well known as an intestinal pathogen, has seldom been isolated from bone or joint lesions. Lawrie (1952) described a chronic *Salm. dublin* osteomyelitis of the femur in a man aged 29 in which *Staphylococcus aureus* was found in association with *Salm. dublin*. Purnell (1952) reported a case of a woman aged 71 with a purulent prepatellar bursitis due to *Salm. dublin*.

The following case is reported because of the unusual localization of the *Salm. dublin* infection to the lumbar vertebrae. It was a post-mortem finding.

Clinical History

A man aged 77 who had enjoyed good health until the latter part of July, 1951, began to complain of lethargy. After a holiday in Scotland he had a shivering attack on August 11, and two days later was confined to bed with a temperature. He complained of increasing lethargy, headache, frequency of micturition, and pain in the left renal angle. Acute pyelitis was diagnosed. He was unsuccessfully treated with citrates and later with courses of penicillin and chloramphenicol. On August 28 he was admitted to the Lytham Hospital for investigation and was discharged in about a week. For the four and a half months until his death, treatment was continued in hospital and at his home. The earlier complaints persisted with increased severity and the patient suffered a long illness, characterized by rigors, high temperatures, and constant backache. Courses of chloramphenicol and aureomycin had surprisingly little effect, although the aureomycin controlled the temperature better than did the chloramphenicol. He died on January 13, 1952, the illness having lasted about five months.

Laboratory Investigations.—The bacteriological findings can be summarized as follows. *Salm. dublin* was isolated from two blood cultures, one early and one late in the illness, and from each of two specimens of urine and faeces, about midway in the disease. Many faecal specimens enriched by tetrathionate broth and selenite F medium failed to grow *Salm. dublin* except on two occasions, on October 8 and 20, 1951. It is noteworthy that before the initial isolation of *Salm. dublin* from the faeces five consecutive specimens of faeces were negative for salmonellae. The same negative results were obtained on examination of five consecutive specimens of faeces after the second isolation of *Salm. dublin*. This illustrates the difficulty which may be