EPIDEMIOLOGY IN COUNTRY PRACTICE

BY

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WITH A PREFACE BY

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PUBLISHER'S NOTE

When this book was first published in May, 1939, it was quickly recognized as being one of those rare books which are destined to become 'classics'. The demand was regular and continuous until April, 1941, when unfortunately the entire bound and sheet stock and the type were destroyed by enemy action. Since then there have been many requests for a re-issue, and it is in response to these numerous appeals, and because the Publishers feel that the book is so obviously worthy of re-publication, that they have had it entirely re-set. No changes were considered necessary, and the book remains virtually the same as when first issued.

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PREFACE

In a book of mine I spoke of William Budd as " almost the last of the old race of epidemiologists ", and, in his charming biography of that great man, my old friend and teacher, the late Dr. E. W. Goodall, objected to the phrase. It was, perhaps, an unskilful one, because it might be interpreted to mean that Budd was a believer in theories now obsolete. That was not my intention. I meant that Budd was one of the last of those physicians who did their own epidemiology, and were not content to sow for others to reap. Happily, Dr. Pickles is proving that even in the sense I intended I was wrong. The old race of epidemiologists is *not* extinct. We have indeed had to wait a long time for a second Budd, but I think we have found one.

I know that one's judgement on the work of a friend is partial. In reading this book I cannot altogether escape from an atmosphere of pleasant memories: memories of happy hours in Wensleydale both with Dr. Pickles himself and with a very dear comrade dead these many years; memories of Dr. Pickles' literary affinity, dear old Gilbert White. Still, intellectual self-esteem encourages me to believe that I am not mistaken in holding that the publication of this book is an important event. Not only does it make positive contributions to epidemiological knowledge, but it holds out a prospect of still greater successes. It clearly expounds a method which many men can apply.

I am not alone in regretting the segregation of what are called researchers. Although we have been called a nation of amateurs, we do not value amateurs as we should;

'amateurish' is an adjective of scorn. I know that in some kinds of research professionalism is inevitable. Even in epidemiology we must have 'experts' of different kinds. But these experts are no wiser than amateurs, and the mere fact that they are experts deprives them of many fruitful opportunities.

I firmly believe that, just as tropical epidemiology received its greatest stimulus from Manson the 'doctor', so will the epidemiology of our own country receive a fresh impulse from discoveries made, not by experts, but by medical practitioners working patiently on the lines of Dr. Pickles. *Magnus ab integro sæclorum nascitur ordo.*

MAJOR GREENWOOD.

INTRODUCTION

PARTS of this book have from time to time appeared in papers published in medical periodicals, and I have to acknowledge with gratitude the permission, readily granted, of the editors of the *British Medical Journal*, *The Lancet*, the *British Journal of Children's Diseases*, and the *Proceedings of the Royal Society of Medicine* to make use of these contributions.

It also affords me much pleasure to acknowledge my sense of indebtedness to Professor Major Greenwood, firstly, for his invaluable help in reading through the manuscript and making many useful criticisms and suggestions, and secondly, in consenting to write a preface ; to Professor W. B. R. King, of London University, for the details on the geology of Wensleydale, and for the accompanying chart ; to Miss Mary Kirby for the epidemiological charts, the plan of the district, and the sketch on page 36 ; to Mr. Eric Barwell for the three photographic illustrations, which I believe I shall be forgiven for describing as very beautiful. While these illustrations are included primarily for the purpose of assisting to explain the geology of the neighbourhood, they serve a further purpose in that they afford some charming views of our lovely dale, a circumstance which cannot be altogether irrelevant even in a book devoted to epidemiology ; and lastly, my thanks are due to Mr. J. J. G. Lodge and Mr. R. M. Chapman for extracts from Askrigg parish registers.

The aims of this book are sufficiently explained in the chapters that follow to render an introduction virtually unnecessary, but some explanation of the large amount of space devoted to epidemic catarrhal jaundice and epidemic myalgia

is needed, for the " gleaning of hedge-side chance-blades " such as these in face of the " full-sheaved cornfields " of the commoner diseases may seem somewhat disproportionate.

My experience of these two diseases in particular illustrates the opportunities offered to country doctors for epidemiological observations, and to all general practitioners for clinical observations. It has been my duty to attend a large number of sufferers from the first of these diseases. I have put down my observations to the best of my ability, but I feel that these are, considering the relatively large numbers of patients, woefully inadequate.

The general practitioner is in the forefront of the battle, and his experience must necessarily be personal and vital. No consulting physician can ever have the opportunity to follow the whole course of such a disease as epidemic myalgia in the same way as the general practitioner, because of the latter's more intimate association with his patients.

In dedicating this book to the people of Wensleydale, I cannot acknowledge too warmly the encouragement and help of my many friends in this neighbourhood in its preparation. Some of the patients who have provided material for this book are no longer alive, some have left the district, but most are still with us. As a chart-keeper, however, I am in a position similar to that of the Recording Angel, the entries in whose book would probably convey little even to those whom they intimately concern.

While I feel that there is nothing in the following pages to wound the feelings of the most susceptible, if by any mischance there is, I ask forgiveness.

W. N. PICKLES.

Aysgarth, Yorkshire.
May, 1939.

BROAD WENSLEYDALE

EPIDEMIOLOGY IN COUNTRY PRACTICE

CHAPTER I

AN APPEAL

A GIPSY woman driving a caravan into a village in the summer twilight, a sick husband in the caravan, a faulty pump at which she proceeded to wash her dirty linen, and my first and only serious epidemic of typhoid, left me with a lasting impression of the unique opportunities of the country doctor for the investigation of infectious disease. This incident showed me clearly the ease with which the *fons et origo* of an epidemic could be traced in the country and the simple steps that were sufficient to bring it to an end. As in the Broad Street pump episode, in which John Snow played so prominent a part, the pump was rendered inoperable. On this occasion the handle was chained to the pump, where indeed it remains to this day, and there were no more primary cases.

It was many years after I had realized this peculiar opportunity of the country practitioner that I read in William Budd's *Typhoid Fever*: "It is obvious that the formation of just opinions on the question how diseases spread may depend less on personal ability than on the opportunities for its determination which may fall to the lot of the observer. It is equally obvious that where the question at issue is that of the propagation of disease by human intercourse, rural

districts, where the population is thin, and the lines of intercourse are few and always easily traced, offer opportunities for its settlement which are not to be met with in the crowded haunts of large towns.

" This is one of the cases in which medical men practising in the country have for the acquirement of medical truths of the highest order, advantages which are denied to their metropolitan brethren, and which constitute, on the whole, no mean set-off against the greater privileges of other kinds which the latter enjoy."

I cannot better support the appeal I am attempting to make to country practitioners than by continuing to quote from this unique work :—

" Having been born and brought up in the village, I was personally acquainted with every inhabitant of it ; and being, as a medical practitioner, in almost exclusive possession of the field, nearly every one who fell ill, not only in the village itself, but over a large area around it, came immediately under my care.

" For tracing the part of personal intercourse in the propagation of disease, better outlook could not possibly be had."

William Budd shows how, in his position as a country doctor, he was able to collect the evidence which led him to the conviction that typhoid fever was a communicable disease, and particularly that the unknown specific infective agent could be conveyed by a water supply from one patient to another. His views were looked upon as peculiar and he himself as cantankerous, but in time the truth, derived as it was from careful observation, was acknowledged by most of his contemporaries. It is unlikely that discoveries of such magnitude will fall to the lot of the country practitioner of to-day, but there is much even now to be done to enrich our

knowledge of the infectious diseases, and careful 'natural-history' observation, undertaken over long periods, will inevitably add to the sum of that knowledge.

In a former essay I wrote of a memorable evening in early summer, when I stood on the summit of one of the noble hills of Wensleydale, and watched the 'eight' train creep up the valley with its pauses at our three stations. In the north-east, Mary Stuart's early prison, Bolton Castle, was lighted up by the setting sun, the attractive little lake, Semmerwater, appeared to lie at my feet, and one by one I made out most of our grey villages, with their thin cloud of smoke. In all those villages there was hardly a soul, man, woman, or child, of whom I did not, and do not, know even the Christian name, and every country doctor of long standing could say the same of his own district.

It is therefore no idle boast for us to say that we stand on a strategic pinnacle for the investigation of infectious disease. Moreover, country doctors tend to remain in one practice and to become part of their district. There is something in country practice—I believe it is the deep bonds of friendship which exist between doctor and patient—that breeds content, and it would be unthinkable in most of us to change our habitat. Also we do not readily retire, and keeping before us always the fate of Milton's carrier, Hobson, have it firmly rooted in our natures that retirement makes for early death.* This wide personal knowledge and love of the country in which we live fit even the most commonplace of us for epidemiological research, and I have known several country practitioners with useful knowledge to impart, gathered from their own observations, but who considered it too

* Ease was his chief disease and to judge right,
He died for heaviness that his cart went light.

trivial even to write down, much less to publish. Nothing, I believe, is further from the truth, and by withholding these observations from the public, these men are damming up sources of information that are among the only accurate ones from which such information can be drawn. It is probable also that these opportunities will not remain available indefinitely as communication with the outside world in these remote districts increases with improved methods of transport.

At the present time, for many of us, these advantages do hold good, and the origin of an epidemic is nearly always traceable. The daily, even hourly, exposure to infection so easy to ascertain gives us the opportunity of fixing the incubation period and the infectivity period in a way which is withheld from our town brother. Without conscious effort the country doctor knows all about his patients. My old anatomy eacher used to say that we should learn our anatomy as a cabby learns London, and in the same way it is no effort to know the ins and outs of our simple country happenings. We know a great deal about each other in country districts, and the village doctor, with his numerous friends and acquaintances—well over three thousand in many practices—has probably a greater knowledge than any other single inhabitant. He knows the relationships, friendships, and love affairs of all his patients, because he is interested in the people and they are a major part of his life. He knows the markets they frequent, the schools which their children attend, and the memorable trips to the seaside or the pantomime. The annual feast is not quite a thing of the past, although in most of our villages it is now merely a memory of what has been. Every year the inhabitants of one of the villages, with due solemnity and ritual, burn the effigy of their patron saint—St. Bartholomew being thinly disguised as "Old Bartle"—and

a large gathering from all the district round about assists at this ceremony. Something like a revival of the old carefree gaiety of pre-war days was seen in the Silver Jubilee and Coronation celebrations, but it is a melancholy reflection how often these and similar festivities have been responsible for the spread of infectious disease. A short time ago, isolated cases of diphtheria were occurring in young people who seldom left their homes. Every one of these had gone joyfully to a dance or a fair about three days before he or she was stricken, and that joyful occasion provided the only possible source of infection. To discover the carrier is no easy task, but to immunize a large proportion of our dalesfolk against this disease—for of naturally acquired immunity there appears to be little—seems to be the remedy against future incidents of this nature.

The object of this book is primarily an attempt to stimulate other country doctors to keep records of epidemic disease and to put before them the unique advantages that their position gives them, to impress on those interested in epidemiology the value of the natural-history method of investigation of these diseases, and to awaken some interest in the layman, whose help in these matters cannot be over-estimated.

I personally cannot acknowledge too gratefully the help I have received in my own investigations from my patients. Possibly our country people are unique in their intense interest in illness, whether in their own families or in those of others. During the outbreak of Sonne dysentery in 1931 three villages were affected, and I should never have traced the infection between these villages had I not had the help of a shrewd observant fellow of whose family the disease took its toll and who had decided correctly in his own mind how the malady had reached the village. In this very epidemic I was trying

to gather information from a mother in one of the affected villages, whose numerous offspring were grouped around her, when we were interrupted by the piping voice of her youngest son, aged 3, who was taking it all in, with "Jack S.'s got it, too". "Jack S." was an elderly giant, with whom all the children were on intimate terms, to which he doubtless owed his infection. This apt remark out of the mouth of a babe and a suckling gave me a useful clue on the spread of the disorder. During the earlier jaundice epidemic, one useful man actually had the initial symptoms of some of the patients in his family, whom I had not seen, recorded in his diary.

It requires very little encouragement to transform the school-teacher into an enthusiastic epidemiologist, and I take this opportunity of thanking those in charge of the schools in my neighbourhood for all the help I have received from them. It is very profitable to pay a visit to the school, and the attendance register will give most useful information.

For many years I have had a helpful ally in the headmaster of our grammar school. He is especially anxious to keep his school free from infectious disease, but even his zeal is sometimes powerless to prevent the school from acting as an exchange for the transmission of infections, for the children come from far and wide, miles out of our area. A few years ago we were particularly successful in stemming an epidemic of mumps. One morning, however, when the master asked a small girl why her face was swollen, she answered: "My mother thinks I've got mumps, but I don't." Thereafter the infection worked its will in the school.

This book is in no sense intended to be a text-book on infectious disease. It would be ludicrous to expect the information gained in a few years of investigation in one practice to provide knowledge which would materially alter

the conclusions, reached from a multitude of sources, in our text-books of medicine and infectious disease. I do, however, affirm that, in the determination of incubation period and the duration of infectiousness, the country practitioner is peculiarly favourably situated, as that short and only possible exposure is often so easy to discover. In my early days of practice in Wensleydale, twenty-five years ago, there were people in that district who had never been in a train, and even to-day many, especially women, seldom leave their homes; it is therefore possible for me to state definitely that such a one suffering from an infectious disorder could only have been infected on a certain date. In some instances, when the infecting patient is definitely known and the stage of the disease from which he is suffering is known, it is possible to say that that particular stage of the disease is an infectious stage.

Recently I had a very good instance of this: An elderly man commenced with symptoms of herpes zoster on Sept. 23. I was unable to find any possible avenue of infection in the neighbourhood, but one morning he showed me a letter from his son, who lives in a large seaport on the east coast, stating that his own little boy (6) had also suffered from herpes zoster.

It then transpired that my patient had spent the night of Sept. 9 at his son's house and had been in contact with the little boy on Sept. 9 and 10. This gives an incubation period of thirteen or fourteen days, and as the little boy commenced on Aug. 24, he was manifestly infectious on the seventeenth or eighteenth day of his disease.

My own opinion, based, as I freely acknowledge, on a very limited experience, leads me to believe that incubation periods, and, in the case of some diseases, infectivity periods, are much more definite than the writers of text-books would

have us suppose, but what is required is the pooled information from a large number of practices similarly situated.

Work on the lines of the School Epidemic Investigation of the Medical Research Council could well be undertaken by a number of doctors practising in remote districts in different parts of the country, and I would respectfully suggest the organization of such a service to that Council, as a necessary corollary to their present inquiry. Failing such an organization, I would like to make a strong appeal to any country practitioner who is interested enough to read this book to record all the information he can gather on the subject of epidemics.

Sir James Mackenzie wrote emphatically on the advantages of general practice as a medium for research, contending that it was the family doctor who alone saw disease in its true perspective, as he had the advantage of observing early symptoms and following an illness from beginning to end. In a similar way the country doctor is able to see an epidemic in its true perspective, as he can follow it from the very first patient to the last, see the epidemic as a whole, and trace accurately the spread of infection.

An enthusiast does not always realize that what is of profound interest to himself may evoke only an amused tolerance in others. Those who are not dog-lovers find it hard to take seriously the affection lavished by neighbours on their dogs. I cannot, of course, write too vividly of the interest which this study of epidemics has brought to me personally, quite apart from the conviction that it must inevitably lead in some small way to an addition to our knowledge of epidemic diseases. A large number of country doctors have been known to me, and many of them have had absorbing hobbies. Two great friends of mine were archæologists of

no mean attainment. Another was a zoologist and botanist, and yet another is an authority on the medieval castle under the shadow of which he lives.

I cannot mention the hobbies of country doctors without recalling, probably the greatest of all, Francis Adams of Banchory, that attractive character who as a surgeon was no mean practitioner of his art, and who could make an effective tourniquet of a handkerchief, a 'spurtle', and his pocket Elzevir Horace, as Dr. John Brown tells us. After his heavy days in the saddle he would retire early, eat a large dinner in bed, and continue into the early hours, surrounded by books, reading, translating, and writing until—such was his industry—he had furnished the world with the first complete English translation of Hippocrates among a host of other writings.

Let me recommend as a hobby, particularly to those young men entering country practice, this observation of the natural history of epidemic diseases. In an editorial on this subject in the *British Medical Journal* it is stated: "Organized medical statistics and laboratory experimental epidemiology are not substitutes for the observation of nature, but ancillary means." We country practitioners are in a position to supply facts from our observation of nature, and it is, I feel most strongly, our plain duty to make use of this unique opportunity.

CHAPTER II

THE LINES OF COMMUNICATION

WENSLEYDALE is not without its history of epidemic diseases in past ages. Our first recorded epidemic did not escape the eagle eye of Creighton, though Wensley is misspelt ' Hensley ' in his book. Those interested in Wensleydale must have wondered why a tiny hamlet should have given its name to a noble dale, and the reason for this is written in the early pages of its parish register. In Queen Elizabeth's day and probably for centuries before, this tiny hamlet was a proud market town, and at the time of its dramatic collapse an important centre with at least 1800 inhabitants. The cause of its collapse was the plague. The learned cleric who compiled the register at this date, in addition to entering his records in the most fascinating of scripts with that joy of penmanship which marked the times, and which contrasts so favourably with later entries, had a pretty taste in hexameters. He writes: " Hoc anno nullos quia desunt quaere sepultos ", and a little later: " Hic equidem video quod nil hoc scribitur anno ".

One can picture the scene of panic and disorder. We know that there were many deaths, as there appears to have been no time for orderly burial in the churchyard, and a mound close to the village, where bones have recently been discovered, is the traditional burial-place of the victims. The injunction on the parish priest to enter births, deaths, and marriages lapsed for this year, as he undoubtedly fled with the rest of the inhabitants, and the proud market town was deserted, and never again regained its position of the most flourishing community in the dale. From the register by a later hand

we find: "The reason as some think that nothing is found written in the register in the yeare of our Lord God, 1563, because in that year, the visitation or plague was hote and fearfull so yt. many fled, and the Towne of Wensley by reason of the sickness was unfrequented for a long season. As I find by one old writing dated 1569, by Jo. Naylor." There are no contemporary records to tell us whether the scourge was plague, typhus, or even influenza, but 1563 was a plague year, and Creighton evidently accepted the parish priest's conclusion.

Much can be learned from these ancient writings, but much must be left to conjecture. Year after year the entries show what appear to be the deaths of the aged and worn-out with but little to disturb their ordered journey from cradle to grave, and then deaths occur in clumps—eight or nine all in a short spell—little peaks of mortality which must have been due to some epidemic of a nature now impossible to determine. There does not seem to have been much communication between the villages, as these peaks of mortality are usually limited to a single village. My own experience of these registers is small and generally second-hand, as I am fortunate in having friends who have spent much time in deciphering them, but I have come to the conclusion that epidemics of a fatal nature have been rare in Wensleydale during the few hundred years these records have been kept, and there is nothing to compare with the entries in our own time during November and December, 1918, the period of the great influenza epidemic.

Many of these registers seem to have been lost or destroyed, and there are no records to show that the plague of 1563 spread to other townships. There is a tradition, however, that East Witton was also attacked, and probably the books, untidy

through age, in which the records of this were kept have been destroyed by some zealous spring-cleaner. In support of the prevalence of the plague at East Witton at this time is the recorded fact that the weekly market in this township was discontinued about that period, having been held for a short spell in a field at the neighbouring Ulshaw. Most of the dale's early records have suffered the fate of those of East Witton, and Wensley alone has a register with entries reaching back approximately to the date of the Cromwellian edict.

The Askrigg registers have been subjected to close study, and there are at intervals considerable yearly increases in the number of burials which we are justified in attributing to an outbreak of some infectious disease of a serious nature.

I am tempted to reproduce in full two entries from the Askrigg registers, and the first reminds me strongly of the often quoted calamity in the family of Archbishop Tait when Dean of Carlisle. This distinguished cleric lost five of his six children from scarlet fever. According to the following extract, five persons died during February, 1730, in one family, and the possibility is that these deaths were due to scarlet fever :—

1730.—

Feb. 1. Allice, dau : of Alexander Rudd of Cubeck.
Feb. 16. Ellinor and Anne daus : of Alexander Rudd of Cubeck.
Feb. 21. Elizabeth wife of Alexander Rudd of Cubeck (age 54 on tombstone).
Feb. 28. Simon son of Alexander Rudd of Cubeck.

The following from a later entry is of particular interest and seems worthy of recording :—

1841.—		Age.
Sept. 29.	No. 794, Alexander son of James and Elizabeth Tiplady, Askrigg ..	3
Oct. 3.	No. 795, James son of James and Elizabeth Tiplady, Askrigg ..	1
Oct. 14.	No. 796, Jane dau : of James and Ann Graham, Askrigg	6
Oct. 14.	No. 797, Richard son of Thomas and Mary Berry, Askrigg	1
Oct. 19.	No. 798, Christopher son of James and Grace Ashbridge	1
Oct. 31.	No. 799, Mary wife of Wilson Moorhouse, Askrigg	34
Nov. 9.	No. 800, Alexander son of James and Grace Chapman	13
Nov. 14.	No. 801, Richard son of Thomas and Mary Berry	Infant.

No. 801 was Richard the second, christened on Nov. 9, 1841, No. 797, Richard the first being christened on Nov. 26, 1839.

The enlightened vicar, the Rev. Richard Wood, who appears to have been a convinced Jennerian, here adds a marginal note :—

Nos. 794 to 801 inclusive died of small-pox, all being unvaccinated except No. 799 and she being very sickly. Upwards of eighty cases of small-pox in Askrigg and only one death after vaccination.—R. Wood.

I think it is clear he meant only one death from small-pox in a vaccinated person.

It is interesting and fairly easy to speculate as to how infectious disease reached this dale in the past. Even at the present day there is a rooted prejudice against the tinkers, or, as they are called locally, the ' potters ', as possible conveyers of infectious disease. I was told last year by an old man, nearing his end, that his father always said that this particular

epidemic of small-pox was brought to Askrigg by a ' potter '. Wensleydale in early days must have been as much a closed community as those herds of mice which experimental epidemiologists find so useful in studying the ways of epidemics. The lines of communication were few and always easily traced, again to quote William Budd. The pedlar would come with his pack and at times distribute more than his exciting wares. The packhorse train up to a hundred years ago was the sole means by which grain, salt, coal—very unpopular because it was heavy for the price it fetched—and other commodities were brought to remote districts. The scene of activity in the villages was graphically described to me some time ago, when the tinkling of distant bells, the only warning of the train's approach, was heard, and our good wool was made ready for the homeward journey. Our cattle-dealers, many of them laying the foundations of prosperity for their descendants, journeyed to the west coast for Irish cattle, which later they drove to Skipton and Northallerton markets. Within human memory and probably for long before that, every fortnight a man trudged wearily over the moors to Barnard Castle with a large pack on his back containing woollen jerseys and stockings. The wool spun at a mill in Askrigg was weighed out to the knitters at Hawes market, who brought back the finished article, which thus found its way to the sailors and fishermen on the coast, via Barnard Castle. In such simple ways must infection have reached the district, as the great majority of dalesfolk lived and died without ever leaving their homes or visiting *foreign* parts.

No water-borne or milk-borne epidemics are to be traced, but it is certain water-borne epidemics must have been prevalent as typhoid fever was a common disease in the memory of our older inhabitants, and the excellent water supplies which we

now possess are a recent development. There has been no water-borne epidemic during the twenty-five years I have been in practice in this district, and the typhoid incident with which I began the first chapter did not take place in Wensleydale, but in a neighbouring district, where the water supplies at that time were largely those offered by surface wells. There was an outbreak of this disease in one of our villages in 1913 with four sufferers only. A wife infected her husband, and also her sister who nursed her, both apparently by direct contact, and a little boy, we thought, received the infection from a stream at which he was known to drink repeatedly, and which could have been contaminated by dejecta from the earlier patients.

No book on the epidemiology of a country district would be complete without some reference to the water supplies, even if it is only to show how unlikely it is that they should

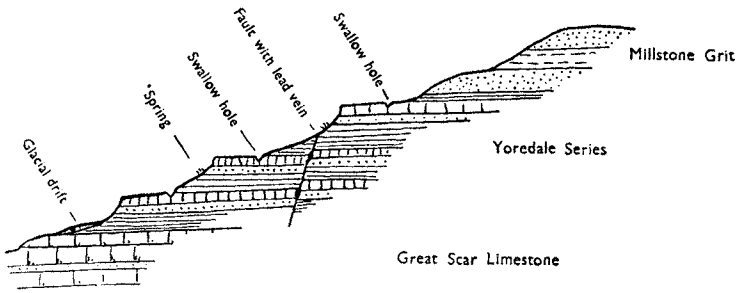

Fig. 1.—Diagrammatic section illustrating the relationship between the various rock types in Wensleydale. Dots = Sandstones and Grits ; Horizontal lines = Shales ; Vertical lines = Limestones.

be responsible for the spread of infection. These water supplies cannot be understood unless the geology of the district is described, and I am deeply indebted to Professor W. B. R. King, of London University, for information on the geology of the district and for the accompanying diagram (*Fig.* 1). He tells me that the rocks consist almost

entirely of sedimentary strata belonging to the carboniferous system, and these strata are lying practically horizontally, with only a slight dip or inclination to the east. Here and there they are fractured by faults of small displacement, many of which once formed an economic feature of this dale, as they were the locations of the lead veins, e.g., at Wensley, Worton, and West Burton, but were of greater importance in the neighbouring valley of Swaledale, with evidence of workings since Roman times. As well as being an economic factor, they also had an important bearing on the health of the people, and I have known several men who were lead miners in their youth who were all of a particular type—stunted fellows, with hard arteries, and with but little prospect of longevity. One I recollect lived to old age, as he probably only worked for a few years as a boy. He used to tell me how for months in the winter he only saw the light of day on Sundays, as he went into the mine before daybreak and did not leave it before it was dark in the evenings.

The geological succession begins with the upper beds of the Great Scar limestone, which by analogy with the Ingleborough neighbourhood may be about 600 feet thick. These strata are exposed in the valley bottoms, and may be seen at Aysgarth Falls, at West Burton, and in Bishopdale. They are, in the main, massive limestones, with shale partings and an occasional sandstone band. Above the Great Scar limestone comes the Yoredale series, which is the name given to these rocks a hundred years ago by Phillips. They are about 1000 feet in thickness, and show a remarkable succession of ' cycles of sedimentation '. Each cycle appears to be the result of a rapid sinking of the land, causing the sea to enter the area and allow the accumulation of limestone and afterwards a deposit of marine shales. With shallowing of the sea these

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pass upwards into estuarine muds, which in turn give place to flags and finally to sandstones. Rapid submergence again occurred, and the process was repeated several times, the deposits of a complete cycle being usually 100 to 200 feet in thickness. When the Yoredale rocks had been laid down the millstone grit was deposited. This group consists of massive grit beds, separated by shales, and in Wensleydale is preserved only on the top of the hills. Over long periods of time these carboniferous strata have been subjected to erosion, and the valley system has been cut out by flowing water, helped during the glacial period by moving ice. The resulting topography is extremely characteristic, with each hard limestone making a 'scar' while the soft shales are worn away to flats. The alternating beds of hard-jointed limestone and sandstone, separated from one another by beds of impermeable shale, have important bearings on the behaviour of the underground water and the location of springs. From the millstone grit springs of water are thrown out by the next underlying shale band. This, as is well known, is good soft water, not at all likely to be contaminated, but the springs are on high ground, miles from the villages, and in only a few instances have they been used for water supplies, partly owing to the great expense entailed in conveyance. At their source they are pure and all that can be desired for every domestic purpose. At lower levels each limestone holds much water in the open joints and cracks, and rainwater is taken into the rock at its upper surface through the numerous 'swallow' holes (locally called 'shake' holes), which can be seen as funnels in the ground at the junction of a shale band with the underlying limestone. The water entering these 'shake' holes appears on the surface at the base of the limestone, and during its underground passage has been cleared and cooled but not necessarily purified.

These springs are of a sparkling tempting coolness, and many are said to taste 'sweet', but a similar quality was attributed to the water from the Broad Street pump above quoted. They vary somewhat in taste, and animals have their preferences for particular springs. In the old riding days a horse of mine would never willingly pass one favourite spring without a drink. Theoretically, these springs are subject to contamination at the swallow holes, which, however, are usually far from dwellings, and the improbable accident of their contamination by the specific germs of human disease is hardly worth considering.

There is another side to the question. It is beyond the scope of this book to enter deeply into the aetiology of endemic goitre, but these limestone waters do contain organic matter, and it is quite possible for them to be contaminated via the swallow holes by the excrement of either sheep or cattle, thus causing indirect iodine starvation in the consumers. In my student days the text-books did not recognize iodine starvation as a factor in the incidence of goitre. Indeed, it was definitely stated that the suggestion of Chatin of lack of iodine as a cause was incorrect. It was suggested, however, that water from limestone and dolomite sources has some relation to the prevalence of this disease, and consequently, on my arrival in Wensleydale in 1913, I was not at all surprised to find large numbers of sufferers in the district. In two villages it was definitely endemic, and in these there was one cretin and one sufferer from myxœdema.

Whilst on this subject I feel I ought also to record that three years ago in one village of less than two hundred inhabitants, who drank the same water from a limestone spring, lived six elderly persons all suffering from paralysis agitans, which appears to be outside the reasonable limits of coincidence.

To conclude the geological details of the district, the covering of glacial material is of uneven thickness, but as a rule greatest in the valley bottoms, forming the rich, rather heavy soil of most of the low-lying land, to which we owe the excellence of our celebrated cheese, while the millstone-grit strata form the heather-covered moorlands. On the whole I believe we can be justly proud of our water supplies, and grateful to those who in the past have used their intelligence, energy, and generosity in providing them. I can say this without qualification in 1938, as within the last few years the only supply that was a menace, as it was most certainly liable to pollution, has been superseded. In this instance the scene was set for a similar disaster to that of Malton, and as former medical officers of health pointed out, all that was needed to produce a like epidemic was a haytime man (who happened to be a typhoid carrier) at the farm, where pollution could take place. Although the water occasionally tasted of sewage or sheep-dip, I cannot honestly attribute a single case of illness to its use. In 1932 there was an extensive epidemic of Sonne dysentery in this village, but as I shall show in a later chapter, although the water supply was suspected, its origin and means of spread were entirely different.

Some of the inhabitants still hanker after their old supply, as the new water is said to be not so good for making tea.

Because of these excellent water supplies, as the present medical officer of health, my sleep is not broken by thoughts of water-borne epidemics, and I believe that it is unlikely that the peace of the dale will ever again be disturbed in this manner.

An old and tried friend who for many years was sanitary inspector in this neighbourhood, and to whom I owe much on account of his wide knowledge of the water supplies and the

sanitary conditions of the dale generally, has given me details of a small epidemic of scarlet fever which occurred in a large town, and which was traced to some cases that had been overlooked in a farm from which the milk went to this town.

The only epidemics that I have myself encountered have been those spread by personal contact, and this contact has usually been easily traced. As I have said, the great majority of our people rarely leave their homes, but there are annual visits to the pantomime and school trips to the seaside, and on many occasions these expeditions have resulted in the importation of infection. Living as we do between two small market towns, which our farmers and others visit weekly, we find that many of our instances of epidemic disease take their origin from these weekly visits, and in the case of the farmers I suspect the covered auction marts as the chief source of infection, especially influenza infection. There are also more direct means by which these infections reach this particular neighbourhood. For instance, a few years ago a farmer spent a night in Birmingham, having travelled this distance to bring back a new car. He commenced with influenza a short time afterwards, infected his family, and they in turn a large village. Again, a few years ago, a particularly worthy schoolmistress returned to her home after a Christmas holiday spent with her relatives. On the morning of the school opening, knowing that she was ill, with commendable if mistaken zeal, she attended her school. In the afternoon she was utterly unable to return, but from that brief morning session a crop of 78 cases resulted. I did not realize this myself until I examined my chart afterwards, and with the exception of one case, which might possibly have been derived from a neighbouring town, there was no other conceivable avenue by which the epidemic could have reached the district.

During the spring and summer months a large number of visitors spend their holidays in the dale. Many years ago I saw a boy from Manchester, full out with a measles rash, who had not been too ill the previous day to be prevented from playing with some of his small friends in the village. It was many years after our latest epidemic, and most of the children in the dale were susceptible, and the result was that the disease spread into every village and hamlet in the district. This boy was definitely the origin of all the cases.

Having reached the district, it is easy to understand the method of spread of these infections. There are now cinemas, and there are, of course, concerts, whist-drives, and dances, which are available to the inhabitants over a large area owing to the increase of transport facilities, of which a recent development is an excellent bus service. All these channels have provided opportunities for infection to my knowledge during the last few years, but the school remains and will remain the largest factor in disseminating the infective agent of an epidemic. Of late years it has been the policy of the education authorities to close the smaller schools and to convey the children from the districts which these served to schools in the larger villages. Such a policy is undoubtedly necessary in the interests of education and has been most successful, but at the present day infections spread rapidly to isolated areas which escaped them in the past, and give us many a weary tramp over sodden fields, especially during an influenza epidemic, when these journeys are not at all acceptable.

No one can over-estimate the advantage that our local grammar school is to Wensleydale, and the headmaster, as I have said before, is *epidemiologically minded* and alive to the dangers of the school helping an epidemic round the countryside. With all the vigilance that he and I could exercise it

was impossible to prevent the spread of infection in the epidemic of measles quoted above, and the school was obviously the channel by which the disease was conveyed into every nook and cranny of the dale and far beyond it.

School closure is a vexed question and much pressure is brought to bear on a country M.O.H. to close the schools at the slightest excuse. There are occasions early in an epidemic when a temporary closure might be completely effective, but my usual policy is to exclude children from outlying farms and hamlets, and I consider this has been satisfactory. What would also be satisfactory would be to close all the churches and chapels and cinemas, and to issue an order against public meetings, dances, and whist-drives, but I find this does not appeal to the very people who clamour for school closure. For one class of malady, infectious gastro-intestinal disease, of which we had a notable example in the large epidemic of Sonne dysentery in 1932, I do intend to advise closure of the schools in future, and when I come to this subject I shall point out why children are more likely to infect others from different homes whilst attending school.

Such are the lines of communication. It will be realized that they are still few in country places, and not very difficult to trace.

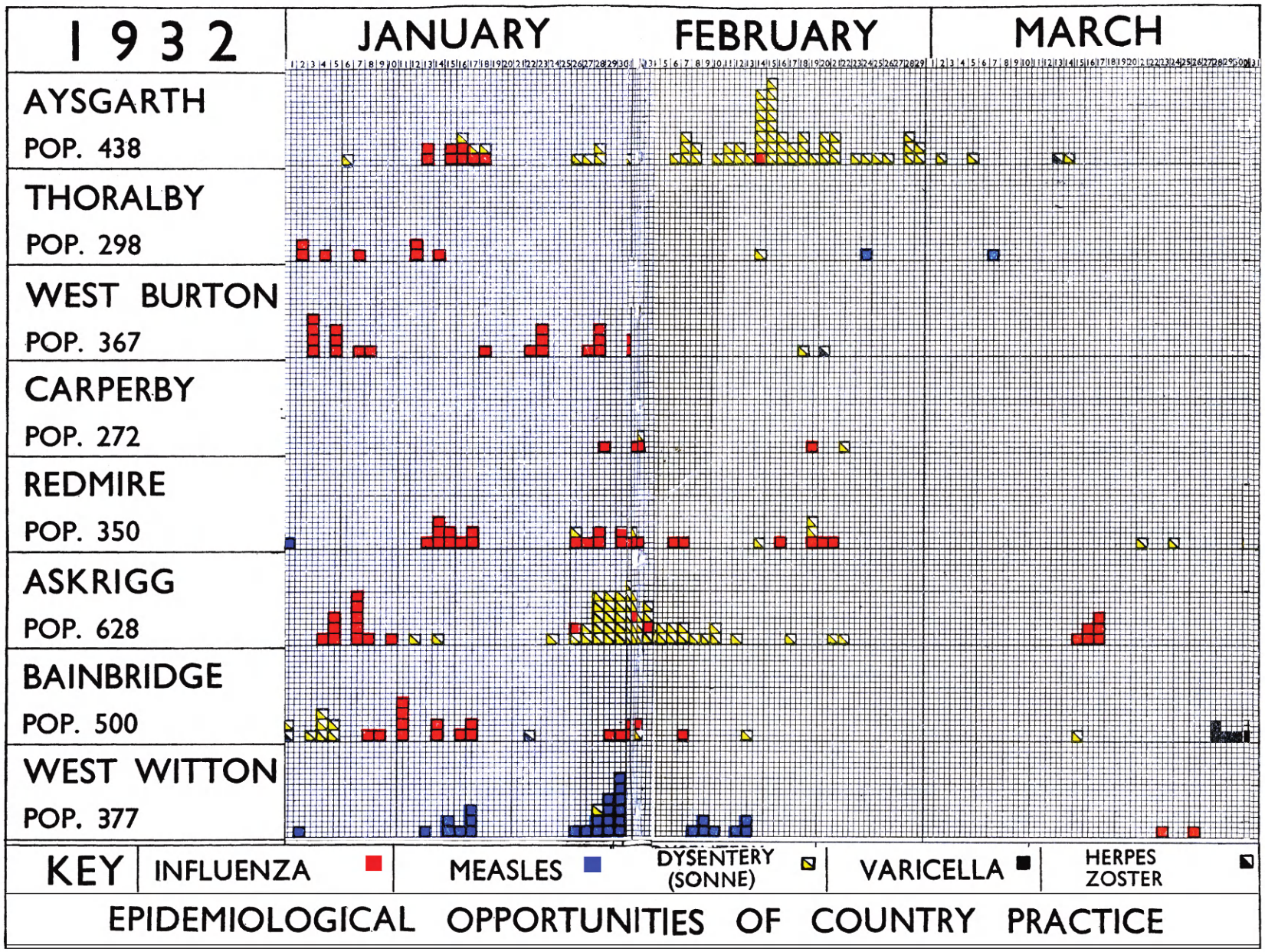
CHAPTER III

TECHNIQUE

IT is not at all original to liken the country doctor to a ploughman ploughing his lonely furrow, but I am tempted to employ the simile as it seems so very appropriate for my purpose. With the exception of those of us who are in partnership, interchange of opinion with others of our profession is rather uncommon. We are all busy, there is little time for visiting our colleagues, and the few occasions on which we chance to meet them during our rounds are necessarily of short duration. The consultation with a physician or surgeon who comes into the district at our request is, what these probably do not realize, an important occasion quite apart from the help and comfort which either brings, and visits from the County M.O.H. or Medical Referee are never barren of interest. The country practitioner to a great extent stands alone, and this was much more the case twenty years ago than it is to-day with increased motor facilities, which make possible attendance at medical meetings, and with the encouragement and financial assistance which are now available for post-graduate study.

My former partner, the late Dr. Dean Dunbar, and I had always found the investigation of our epidemics of great interest, and had made desultory observations on incubation periods and mode of spread, and it was our duty to do so, as the local medical officership of health was held by him; but it was the second and extensive epidemic of jaundice that showed the necessity of some system to replace these haphazard methods. On this occasion I had the help and guidance

Chart I.—VILLAGE EPIDEMIOLOGICAL RECORDS

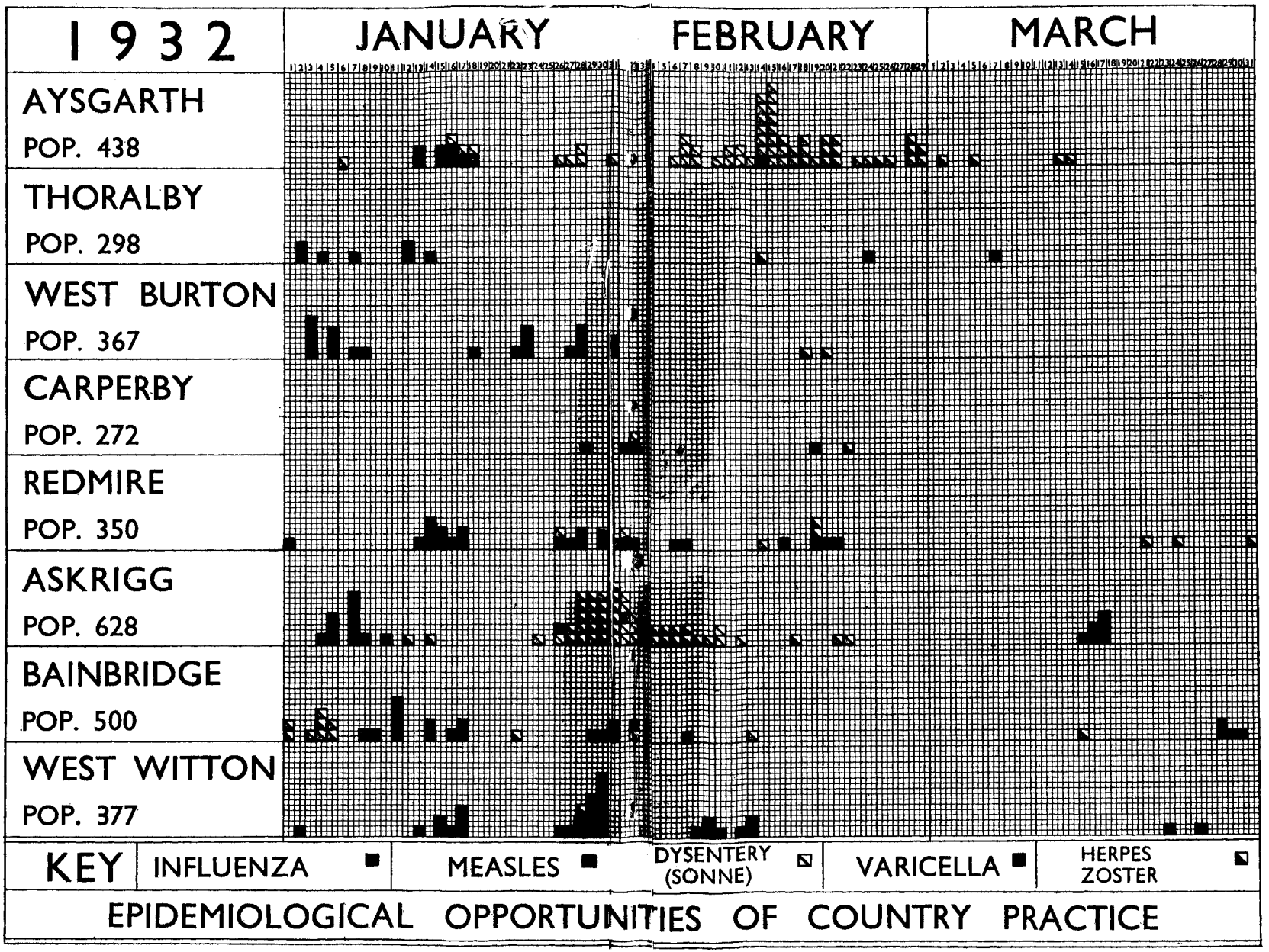


of Dr. W. A. Lethem of the Ministry of Health, and through him I was introduced to other members of this body, and found that the Ministry was not only willing but anxious to help. Sir Arthur MacNalty, in his annual report for 1935, emphasizes this, and hopes "that general practitioners in rural districts may put on record some of the epidemiological observations made by them in their daily work and so make a valuable contribution to our knowledge in this field". He states further "that the advice and assistance of the Medical Staff of the Ministry of Health will always be freely at their disposal".

It was on account of a fundamental disagreement on the incubation period of epidemic catarrhal jaundice, which I shall go into fully in a later chapter, that I met Dr. Alison Glover, of the Board of Education, who was then a medical officer of the Ministry of Health. He showed me the charts of epidemic diseases which were being kept by the medical officers of certain public schools in the Medical Research Council Investigation mentioned in my first chapter. We both realized at once that these charts could be readily adapted for recording similar diseases in a country practice, and I wish here to acknowledge warmly my debt to Dr. Glover for his original suggestion and the help and kindly criticism which he has freely given me since in everything that I have attempted on epidemiological lines. It is somewhat diverting to remember that such a friendly and to me helpful association arose out of a seemingly irreconcilable difference of opinion.

By courtesy of the editor of the *University of Leeds Medical Society Magazine*, I am able to make use of a chart which first appeared to illustrate a paper written at his request and published in February, 1934 (*Chart I*). *Fig.* 2 is a plan of the district to help to explain the chart. The villages are

Chart I.—VILLAGE EPIDEMIOLOGICAL RECORDS



arranged in the charts in what I believe to be their natural groups, and in the one reproduced the group is named after the principal village, which is printed on the left of the page. Ordinary graph paper, 24 × 18 in., is suitable and was my first choice, but a smaller paper, 12 × 9 in.* is much better,as

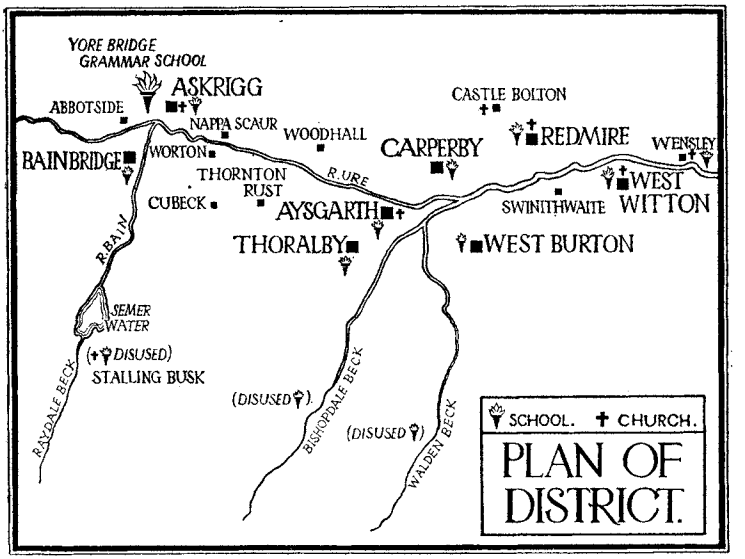


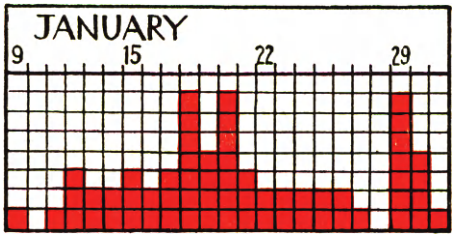
Fig. 2.—Map showing position of villages referred to in *Chart I.*

the whole of the chart can be seen at a glance. Moreover, these when bound in book form do not make a cumbrous volume, and, as they are printed in light blue, the completed charts have a decidedly artistic appearance. A coloured square is now decided on as a symbol for each infectious disease. For instance, in the chart shown, influenza has a red square, measles a blue square, and dysentery a square yellow below the diagonal, as the complete yellow square is the symbol for jaundice. This arrangement, however, is conventional, and

* Obtainable from Messrs. Langley & Sons, Ltd.

could be varied according to the taste of the individual chart-keeper. As will be seen from the one reproduced, each chart covers a period of three months. A pocket diary, in which to write at the bedside the names of the sufferers from all infectious diseases under the date of their commencement, is the next article required. Great care should be exercised in arriving at the correct dates, and except in a busy period these

Chart II.—INFLUENZA



The schoolmistress fell ill on January 9.

should be entered in the chart at monthly intervals. The facts—and they must be facts—are, I believe, best recorded in mechanical fashion, and the chart can then be studied for the information which is certainly present in some of them.

The small epidemic of influenza originating in the schoolmistress, described on p. 20, is recorded as shown in *Chart II.* In the book the names of the sufferers are written on the page opposite the chart under the name of the disease and its appropriate symbol, and short notes on the information obtained from the chart, evidence of exposure, and explanation of the spread of infection between the villages are added. Clinical notes on the patients can also be included, and accounts of the type of epidemic after the manner of Huxham, Wintringham, and Hilary can be inserted, so as to bring all the information under one cover.

With the delightful co-operation of my wife and daughter, I have been keeping such charts since April, 1931. In the absence of family help I believe it would be possible for any one who is similarly interested to obtain the services of some neat (and discreet) child to relieve him of most of the drudgery. The results of chart-keeping during this period, if not particularly striking in themselves, have nevertheless encouraged me to believe that much valuable knowledge could be accumulated by a team of doctors similarly placed, working in conjunction with each other, and keeping accurate records over a long term of years.

CHAPTER IV

THE COMMONER DISEASES

HAVING developed a technique for recording epidemic diseases, I now possess charts which contain all the instances of infectious diseases that have occurred in my practice during the last seven years, although from the epidemiological point of view these years have been comparatively dull. Speaking as a humanitarian and a medical officer of health this is, of course, most satisfactory, but as an epidemiologist it is rather unfortunate that I should have chosen seven years in which there has been only one large influenza epidemic, no extensive measles epidemic, no German measles, very little scarlet fever, and until recently, when we had six victims, only a single sufferer from diphtheria. I always remember Sir George Newman's quotation from Pasteur by way of solace, " In the fields of observation chance only favours the mind which is prepared ", and realize that when the inevitable epidemic of any particular disease does appear, the method of investigation will not have to be evolved to meet the occasion. If other country doctors feel disposed to keep similar charts, there will be many months in which the labour may seem to be in vain, but they will not only have their minds prepared, but will have a technique ready to hand to grapple with the epidemics as they come along. I do not forget that on the very first page of my chart book the connexion between herpes and chicken-pox was plain for any one to see.

Influenza.—This chapter on the common infectious diseases naturally commences with the commonest and most important, which is influenza. From the country doctor's point of view

nothing alters the character of his work, with the possible exception of a measles epidemic, in the same way as this disease, for an influenza epidemic may transform a busy but orderly existence into a nightmare. As a tribute to his memory, and because it is possible that this book will be read by Wensleydale people, I cannot forbear to recall the heroic struggle for many weeks of my late partner, Dean Dunbar, in the pandemic of 1918, a struggle which greatly endeared him to his patients and which gave him a name that will be remembered for long in this dale. Such instances of self-sacrificing devotion were no doubt common in that period, when so many of us were required for the services. Since that dread time, in 1924, 1927, 1929, and 1931, we have had very extensive epidemics of this complaint, but with this difference, that there was hardly a patient in any of these epidemics who gave us a moment's anxiety, and the death-rate was providentially negligible. There was a return of our old enemy in 1937, when the epidemic spread more rapidly than in previous visitations, due probably to the improved methods of transport. This outbreak, however, was also not of a serious nature, although its very rapidity of spread made it one of the most difficult with which we have been confronted. To enter fifty or more houses and see probably three times that number of patients is no light task in a district with a scattered population. In addition some of these patients have to be visited a second time. Then, again, a large number of messages are received from those who *think* they have influenza, and also from our *malades imaginaires*, who feel that without a warning they are bound to be neglected in such a strenuous spell. There are also those who want a ' bottle ' as a prophylactic " rather to scale it away ", as they say—' scale ', like so many of our North Riding words, being, I believe, good old Norse.

We read much at the present time in the press of the medicine-drinking habits of the population of this country, with special reference to those who come under the State Insurance Act, and therefore it is not surprising to find that in this district ' the bottle ' is still very dear to the patient's heart. In all these epidemics our dispenser packed in our cars a large basket of appropriate remedies, which were doled out to our grateful patients, who had no possible means of sending for them.

I read not long ago that the appalling death-rate in the well-known epidemic of measles in Fiji was due not so much to its being a new disease for which there was no inherited resistance, as on account of the lack of nursing facilities, and that, owing to whole families going down simultaneously, the very necessaries of life could not be provided. The ' controls ' in this epidemic were the members of the police force, whose conditions of living were entirely different, and who therefore showed a death-rate not above the normal. In some of our isolated farms during an influenza epidemic a state of affairs similar to that exhibited in Fiji was faithfully reproduced. The house was as cold as a vault, as not a single member of the family was in a fit state to crawl downstairs to light the kitchen fire. Food had been for days a difficult problem, and hot drinks an utter impossibility. Neighbours are very good, and at our request this was soon remedied, but with the inevitable result that the disease spread to the homes of the good Samaritans themselves.

There have been two small epidemics between 1931 and 1937. One of these, which I mentioned in my second chapter as originating in a schoolmistress, raises a notable point. The area which suffered in this epidemic of 78 cases practically escaped in 1937, a circumstance which may indicate

some degree of partial immunity in the inhabitants of the area.

There was something to be learned from the latest epidemic. As I have said it spread with much greater rapidity than its predecessors, and its duration was barely three weeks, but in this time 10 per cent of our people were victims. Our previous epidemics lasted two months, and spread slowly from village to village, so that we were rarely busy in more than two or three villages at one time.

The few accurate observations I was able to make on the incubation period lead me to suppose that it was never less than two and never more than three days.

A curious little outbreak of this disorder occurred in June, 1935, in one of our villages, when we thought we had escaped the pest for that year. The disease ran a normal course, and certainly appeared to be the typical form of influenza, and the form which would be likely to reproduce the disease in ferrets, but it left its victims, mostly children, with a spasmodic cough, which was definitely not whooping-cough, but to which it bore a striking resemblance. I was interested to notice that other epidemics with this sequela were reported in the medical press shortly afterwards.

In 1938 we again seemed to have escaped influenza altogether, but rumours of sufferers in surrounding districts reached us, and at last a few instances appeared in March, with a large incidence of lobar pneumonia.

Measles.—The longer the incubation period in virus diseases, the longer the time before an epidemic comes to an end. A measles epidemic in this district usually lasts six months. When we come to discuss mumps we shall find that an epidemic of this disease lasted a year. Our measles epidemics seem to have a periodicity of about nine years, so that it is unlikely that

we shall escape a similar outbreak in 1938 as our last one was in 1929. I wrote this sentence in 1936, and I have allowed it to stand, as in the present year (1938) the dawn of another epidemic is appearing. Two children, a brother and a sister, attended one of our schools feeling out of sorts on the first three days of the week commencing Feb. 28. The rash of measles commenced in each on March 3. There were no other sufferers from measles in the whole district, but these children had been to a pantomime in Leeds, where measles was rife, on Feb. 15 and no doubt were infected with the disease during this excursion. The prodromal symptoms in the little girl were negligible, and it is hard to state a date of commencement for her, but the boy's symptoms definitely began on the 27th, giving an incubation period of twelve days. The whole of the susceptible population of the school with two possible exceptions then contracted the disease.

The third wave is now in progress, and by attempting to make this the last, by a rigid policy of isolation of susceptible contacts, in which I am being loyally aided by my patients and the schoolmistress, I am hoping against hope that the epidemic will come to a dead end. This policy is, of course, interfering with nature, and it is practically certain that even if the rest of the dale is not infected from the patients in this village, it will have to suffer during the present or succeeding year, as the children are for the most part susceptible. (*Chart III.**)

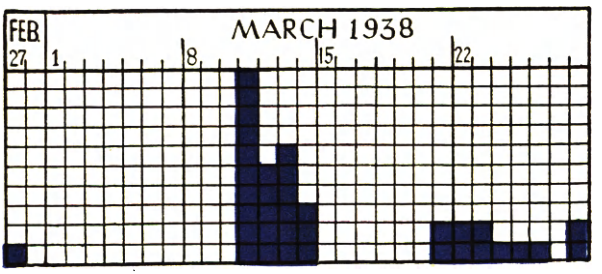
Sporadic cases have occurred in the interval, but they have been very few in number and there has been no spread, as all who were in contact, with very few exceptions known to me personally, had the disease in 1929–30, and the proportion of children born since the last epidemic is only now becoming

* The chart represents the whole of the epidemic, as it did not spread to other villages.

of importance. I cannot say why we do not have the biennial epidemics which admittedly recur in the large towns, but I simply record, with an uneasy feeling that I am raising more points than I am able to solve, that the epidemics do recur about every nine years.

One large village and a small one, served by a single school, escaped in our last epidemic and remained free until a small boy, who had returned from a visit to his grandmother in another area, went to a school treat on Jan. 2, 1932, in the early stages of the disease. Thereafter a large crop of cases occurred, and

Chart III.—MEASLES



At School 28th February, 1st and 2nd March

from these most of the remaining children in the immediate neighbourhood and some adults were infected. (*See Chart I*, p. 24.)

During this epidemic I had an opportunity of arriving at an estimation of incubation period by one instance of infection when the only possible exposure was definite and of short duration. A man in a village remote from the prevailing epidemic exhibited the disease. Twelve days previously another man had called at my surgery, and, finding no one at home, repaired to the inn, conveniently situated on the other side of the road, and sat cheek by jowl with the first man over their pints. Returning to the surgery he was found to be suffering

from measles. During the short visit to the inn he appeared to me, without a reasonable doubt, to have infected his companion. The incubation period was most accurately twelve days.

In an earlier epidemic, the following incident also suggested a twelve days' incubation period :—

A boy in a farm ' place ' arrived at the surgery on his bicycle, and announced that he had ' gitten mazzles ' (contracted measles.) This was certainly the case, and he was told to go to his mother's home, and shout to her the same tidings outside the door in order that she might have the living-room cleared of his small brothers and sisters. He then repaired to his bedroom, where he remained a fortnight. On the twelfth day after his arrival, his aunt, and only his aunt, became a victim of the disease, although she had never seen the boy, and left the house the morning after his arrival. It was found that the boy's bedroom and the living-room directly below, by an unusual and capricious arrangement of the builder, were lighted by one long window, giving direct aerial access from one room to the other. The meal table was below this gap, and the aunt, who sat directly underneath at meals, was apparently thus infected. A diagrammatic representation of the window is given in *Fig.* 3.

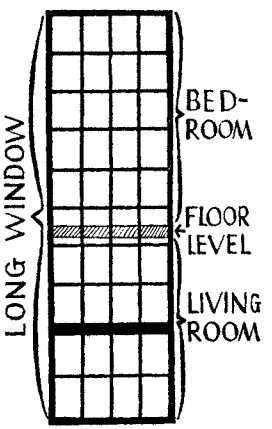


Fig. 3.—Diagram of window referred to in text.

The epidemic of 1929–30 in which the last incident occurred was remarkable for the number of adults which it attacked. There was a large number of young adults among the victims, many in the forties, and one veteran of 68, who to his dying

day refused to believe he had suffered from measles, as " 'twere but a childish complaint ".

Very few of our patients gave us any anxiety, and it is worth noting that there was not one instance of even the mildest ear trouble.

As regards incubation period, I believe instances such as those above are the only reliable ones on which to base incubation period in measles or any other disease, and are decidedly rare. Family outbreaks do not give accurate information, as it is not certain at what stage the original sufferers transferred the infection. Three years ago there was an outbreak of measles limited to one family, but that a family of ten children, probably our largest at the present date. One child contracted the disease on a visit to relatives and commenced on March 25. Five of the others began on April 5, giving an incubation period of eleven days, three on April 6, and one on the 7th. I have, however, seen crops in families, part of the family infected from the first patient and the rest from the second crop. This leads me to believe that measles is only infectious for a very short period, and I commend this as a subject for investigation to other doctors, as it certainly will be to me in any future epidemic. I can make no dogmatic statement on the small evidence at my disposal, but I believe that careful investigation will probably establish the very short infectivity in measles. I am confirmed in this belief by the fact that the statisticians have come to a similar conclusion from their examination of the records of epidemics. Acting on this assumption, I have never enforced isolation after a week from the beginning of the illness.

The incidence of a second attack in the same individual is said to be 1 in 200. I have no statistics to offer on this point, but I have never as yet attended the same

patient in two attacks in my twenty-five years in this practice.

In every epidemic a few babies under a year old have contracted this disease. In almost every instance the baby's mother was simultaneously a victim, both infected from the school child in the family, showing that the mother herself had had no immunity to bestow on her offspring.

The disease is probably infectious, as is often stated, towards the end of the incubation period. As I have said, when I have been able to trace infection in a patient to a single exposure of short duration, the incubation period appears to be twelve days, but I find in families that this is frequently shortened to ten or eleven, which suggests that the infection is present one or two days previous to the advent of symptoms. In the present epidemic *Roland* and *Edith* first had symptoms on March 11, their mother on March 21, the baby brother and a little sister on March 22. There has been little variation in the incubation period as I have observed it, and I believe that it is in the neighbourhood of what I have always seen when I could trace the infection to a single exposure, and that has been twelve days.

Life on the tidal beaches was governed by the phases of the moon, and a rhythm was implanted in living things which still holds good to-day. There is a little variation in the incubation period of a hen's egg, in the time of gestation in mammals, and even in the menstrual cycle of healthy women, and, although the parallel cannot be stressed too far, I believe that the great variation in the incubation periods of disease which has been taught is due to lack of opportunity in observation.

Scarlet Fever.—Of this I have little personal experience, as there are very few entries in my charts, and in the whole of my time in this district we have had comparative freedom from

this complaint. But "what is scarlet fever for the clinician?" as F. G. Hobson asks in a valuable paper published in *The Lancet* in 1937, which all should read. There is the typical 'scarlet' with the throat and the strawberry tongue and the rash which looks hot and feels hot and only admits of one diagnosis, which at the present time gives us not the slightest anxiety. This, as Hobson points out, is the only form which we are under a legal obligation to notify, but there are other manifestations of infection by the same or very similar organisms which are just as infectious and give infinitely more trouble. It is said to-day that patients who are infected by the hæmolytic streptococcus and do not develop a rash are those alone who are likely to cause anxiety from complications. My small experience is in complete accord with this expression of opinion.

Four years ago I attended a young married woman with a throat affection which appeared to be typical of scarlet fever, and which was followed by a septic pharyngitis and laryngitis with alarming symptoms, suggesting œdema of the glottis. Her elderly mother who nursed her also developed a sore throat, and then the worst attack of erysipelas I have ever seen, from which she only just managed to recover. The young woman who nursed this patient contracted a septic finger and an axillary abscess with cellulitis spreading to the breast, and was laid up for some weeks. These are much more serious conditions than the scarlet fever we see to-day, but are all due to a similar organism. I personally have never seen an acute nephritis following notifiable scarlet fever, but many of the instances of this disease which have come under my care have been connected with epidemics of sore throat of which the patient was a victim. Nine years ago I am convinced that practically the whole of the child population in one village

suffered from scarlet fever in a mild form. The sole patient we attended was a poor little fellow with running ears, who, as he was the child of milk-sellers, was sent to hospital, where he nearly died of measles contracted after his admission.

This raises the point of hospitalization of sufferers from this disease in country districts, and my policy now is to keep all at home. I find that this can be done without detriment to the public health and I get no return cases. The problem for the medical superintendent of the fever hospital is a very different one from my own. He endeavours, quite rightly, to discharge his mild 'scarlets' at the earliest possible moment, fearing a superimposed infection by a more virulent strain. I find, therefore, that on their return these sufferers must continue to be watched and isolated. If isolation can be carried out after the patient's discharge from hospital, it can be carried out quite as effectively from the beginning of the illness. I have also thought it probable that the early stages of this disease are comparatively non-infective, and I can certainly produce evidence in support of this. Why, therefore, send the patients to hospital, subject them to the risks of infection by a more virulent strain of the same disease, not to mention the possibilities of measles or even diphtheria, until the cubicle system is adopted universally, for the very stage of scarlet fever which is least infective? In my early days in this practice, when we kept all our patients at home and relentlessly isolated them for long periods, the experience with few exceptions was one patient only in each house, and here are instances which, I believe, point to the comparative absence of infectivity of the disease in its early stages:—

1. A boy of ten commenced with scarlet fever on Nov. 23. I saw him on Nov. 26 and promptly dispatched him to hospital. He had three small sisters, and although there had not been

the slightest attempt at isolation, all escaped for the time being. The boy returned on the evening of Dec. 20 and was suffering from paronychia and a very slight nasal discharge which escaped notice in hospital. On the morning of the 24th his three little sisters fell sick, and when I saw them on Christmas Day were in full rash. Incidentally the whole family developed measles from infection at hospital.

2. Several years ago I saw another victim of this disease, a young man, who had apparently commenced two days before. On the day of onset, though suffering from sore throat and feeling rather ill, he kept a ' date ' at a dance with his young woman, with whom he was presumably in fairly close contact. He also danced with several other girls, but did not succeed in infecting any of them with scarlet fever. This, I suppose, proves nothing unless we have the certain knowledge, as we have in the incident quoted above, that the contacts were Dick-positive. I do not think, however, that this need trouble us, as most of our country people are susceptible to the disease, and given the opportunity of infection, which I believe is provided mainly by patients in a later stage of the disease, it is a common occurrence for quite elderly people to develop scarlet fever—witness a woman of 58 early in 1936, and two middle-aged people later in the same year.

3. A girl of ten, having commenced to be ill the previous day, with considerable fortitude attended a tea-party given to celebrate a public occasion and was found to have a rash on reaching home. There was a large number of children at this party as well as adults and not a single other case appeared, although her mother who nursed her developed the disease nine days after, and three days after the child had developed a nasal discharge.

I have had a few instances of a definite exposure of short duration. In no case was it less than three days or more than four, three days being the most usual.

Now that diseases of the typhoid group seem to have disappeared from this and most other rural areas, scarlet fever is the most difficult of all these maladies which we have to face as sanitarians. It is a platitude to repeat that epidemics are kept alive by the patients who escape notice either because of the extreme mildness of the attack or the absence of rash, and still more, despite our vigilance, by the discharging ears or nose of those long since convalescent. Some years ago I allowed one small girl, whom I had actually isolated for three months, and whose nose I thought had ceased discharging, to return to school. Curiously enough, she left all her schoolmates unscathed, but quite obviously infected an adult with whom she had taken tea during the first week of her release.

The necessary interference with the livelihood of the farmers makes this disease a very unpopular one in country districts, and, if all patients are sent to hospital, a very costly addition to the expenditure of the Rural District.

As is well known, scarlet fever has passed through many fluctuations in severity. I happen to possess John Pechey's edition of *The Whole Works of that Excellent Physician, Dr. Thomas Sydenham*, printed in 1701, and it is interesting to see scarlet fever referred to as " this name of a disease, for it is scarce anything more ", and many of us in this period would hold the same opinion of the disease as we have seen it. It is good to have had a father in this profession, as I had, whose account of scarlet fever in his young days was very different, and whose opinion of the disease explains the very real fear which is still felt in our area, where memories are long and the

tragedies of the past are never forgotten. Scarlet fever in those days was ' fever ', i.e., *the* fever, and required no qualifying adjective any more than, as Greenwood writes, the plague requires one. The disease must also have passed through a mild phase at the beginning of the last century, but the physicians of that period congratulated themselves complacently on the improved methods of treatment to explain the reduction in the death-rate. We ourselves have no such pleasing illusions, and can hope only that the reappearance of the malignant form will be long delayed.

Whooping-cough.—There are numbers of entries of whooping-cough in the charts, but nothing of much interest to record. The two large epidemics have been fortunately of a mild nature and few patients have received medical attention, the names and dates of the sufferers being obtained from inquiry at the schools or from the parents.

In this disease the onset is so often insidious that it is very difficult to fix an incubation period. However, I have no instance in my charts to support as short an incubation period as three days, such as has been suggested by R. E. Smith and others. I had one good instance of the short and only possible exposure in the last epidemic. Two children in different villages began with whooping-cough on July 16 and 17 respectively. They were the first patients in these villages, and I found that they had both been to Redcar on July 1 for the annual school treat, and that there were definitely sufferers from this disease in the train among the children from a village further down the dale. Even allowing for an insidious commencement, the incubation period in these two cases must have been more than a fortnight. From previous observations in families, I had fixed the period as from ten to twelve days, but just as in measles,

it is possible infectivity may be present prior to the exhibition of symptoms.

Of the duration of infectivity I have nothing to say, as I have no incidents fixing its length, and I have not as yet made use of cough-plates. I have always isolated the patients for six weeks after the beginning of whooping, and this appears to be satisfactory, although probably erring on the safe side.

Epidemics of whooping-cough do not show a tendency to spread from village to village like those of measles and influenza, possibly because the average age of the children is less and generally before the school age. Whooping-cough does not appear to be a serious disease in Wensleydale, probably because the children with few exceptions are of superior physique, well fed and well cared for, and there is a complete absence of rickets. I have entries of 146 sufferers during the last seven years, and among this number there has been no instance of pneumonia and no death. In the 1924 influenza epidemic, a baby suffering from whooping-cough was secondarily infected with influenza which had attacked the rest of the family. This baby died in a few days, and its death is the only one I have to record from whooping-cough.

Mumps.—Mumps leaves us alone for long periods, and in my twenty-five years I have seen but one epidemic. This began in August, 1935, consisted of exactly 100 cases, and lasted a whole year, due to its long incubation period. My own experience, however, does not support an incubation period as long as twenty-one days, and I have a few instances of the short and only possible exposure.

The first was an infection at a wedding outside the district. *Betty* was a bridesmaid at this wedding on June 11. She was a rather sick little bridesmaid, and later was found to have this disease. On the evening of the 26th her mother first had

symptoms, and a few days later showed me a letter from her sister, the bride of the 11th, stating that she also began on the selfsame evening. The incubation period in the case of the bride was definitely fifteen days, and as the little bridesmaid was quite well the day before the wedding the duration in the mother's case was possibly the same.

The second incident was in a family visiting the neighbourhood. *Anne*, infected at her boarding-school, commenced on Aug. 8, but was not isolated until the 10th. Her sister developed mumps on the 23rd, and her aunt, who was of the party, on the 25th. The possible days of exposure were the 8th and 9th, so the incubation period in the one case was fifteen or sixteen days, and in the second seventeen or eighteen. In the aunt's case it was conclusive, as she did not join the party until Aug. 8.

The third incident was this : A boy of thirteen attended school on March 5 and 6 in the early stages of the disease. The next two sufferers in the school commenced respectively on the 20th and 22nd, suggesting an incubation period of fourteen or fifteen and sixteen or seventeen days. These are the only instances I could find of dated infection in the whole of this extensive epidemic.

The period of infectivity appeared to be less than a fortnight. Grammar-school boys and girls were infected by their younger brothers and sisters at home, and by fixing a fortnight as the period of infectivity the school was kept clear until the girl mentioned before, who knew better than her mother, started the ball rolling.

As a precautionary measure, all home contacts, although allowed to continue at school for the fortnight following the appearance of the disease at home, were kept away for the next fortnight, during which time most of them succumbed

themselves. The disease was of a mild type, and the only complications were orchitis in two adult males and swelling of the lachrymal glands in one little girl.

Lobar Pneumonia.—Lobar pneumonia has not been common during the period recorded until the present spring and summer, when we have had fifteen sufferers. Two patients suffered from this disease in a very small village in August, 1933. The first patient commenced on the 14th and was in contact with the second—who developed the disease on the 17th—on the former date.

Chicken-pox.—This, the remaining common disease, is allotted the next chapter, where its connexion with herpes will be discussed.

CHAPTER V

CHICKEN-POX AND SHINGLES

CHICKEN-POX behaves in the same way as whooping-cough in failing to spread widely through the district. It tends to remain in one village or, where there is a sister village with a common school, in the two villages. Consequently we generally have instances of the disease in the neighbourhood, although it did disappear altogether for the fifteen months beginning January, 1936.

The explanation of its behaviour as opposed to measles is that at all times, as the epidemics are not widespread, there are some villages with a large number of susceptible children, and the opportunities for infection from outside are abundant. For a village to become sufficiently vulnerable to make an epidemic possible takes many years, and although I have not been able to work out the exact interval required, the charts show that there has not been a single sufferer in Carperby since the large epidemic of the spring of 1931, which, as I write, is a period of seven years. Possibly the time interval of freedom for individual villages is the same as that which we find is true for measles over the whole area, namely, about nine years.

In the whole district there have been 177 sufferers from this complaint in seven years. This figure is probably understated, but not very much, as I made searching inquiries when I was aware of the existence of an epidemic. Chicken-pox as viewed in these 177 patients was no more than an inconvenient infectious rash. The only death recorded was that of a pitiable but cheerful little mongol, much beloved by

her family, who developed encephalitis with a definite hemiplegia. I have no instance of the short and only possible exposure, but the interval in families is thirteen or fourteen days. I have an instance of infection from a sufferer from herpes zoster at a public celebration when the incubation period was in two patients respectively fourteen and fifteen days.

I have not as yet had a good instance to prove the duration of infectivity, but the disease is certainly very infectious in the early stages and probably in the last few days of the incubation period, and remains infectious for at least a week after the appearance of the rash.

In view of the suffering caused by herpes zoster in adults, it would seem to be a great misfortune not to acquire chicken-pox in early life. In these 177 patients there were two instances of chicken-pox in adults, but during the same period there were fifty-six instances of herpes zoster or herpes frontalis. There was one youthful sufferer from herpes zoster, a girl of nine, who, compared with the adult victims, escaped very lightly.

The epidemic peaks of the two diseases roughly correspond, but in three epidemics sufferers from herpes appear on the charts first, and in two epidemics the origin was definitely traced in one instance to a patient with herpes frontalis and in the other to a patient with herpes zoster. The age incidence of infection with the two diseases shows what is well known, that when exposed to the same infecting agent, chicken-pox is more likely to develop in a child and herpes in an adult. I have questioned all the sufferers from herpes, and only one gave me the information that he had suffered from chicken-pox. This patient, a man of 40, had a negligible attack of herpes zoster with slight constitutional upset, but he very definitely

infected his small son with chicken-pox, as there was no other possible source of infection.

The connexion between herpes and chicken-pox was first recorded in medical literature by a Budapest physician, Bokai, who observed the association in 1888. His paper is summarized in *The Lancet* (1892, **2**, 679), and instances are given of the appearance of herpes zoster in a patient apparently infected by another who was suffering from chicken-pox, and chicken-pox appearing in children after contact with patients suffering from herpes zoster or herpes frontalis. Like so many discoveries, it seems to us extraordinary that the observation of the connexion between the two diseases is of such recent date, and on more than one occasion I have found that the association had been taken for granted by my patients, who could not have acquired the knowledge from medical books.

Many years ago five of the old people in our poor-law institution had attacks of herpes zoster and the assistant master's little son developed chicken-pox, being the only sufferer from the latter disease in the district.

Previous to the 1937 epidemics, I have three instances of the association.

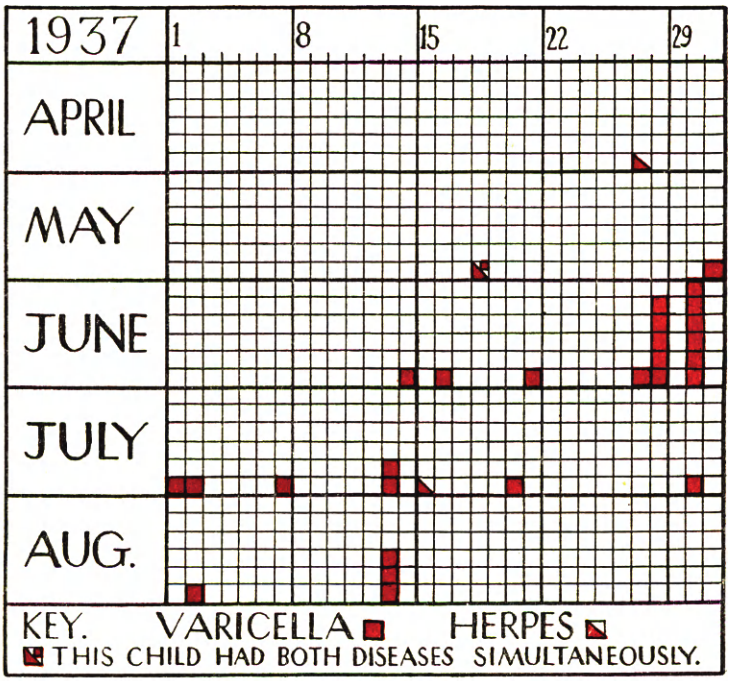
1. Some years ago, on Nov. 14, an old man fell ill with herpes frontalis. Two grandchildren lived in the same house. The first developed chicken-pox on Dec. 2, the second on Dec. 15.

2. On Oct. 1, 1934, a man of 30 began with herpes zoster. There was no chicken-pox in the village, which is a remote one, until Oct. 14, when a small girl was attended for this disease and was found to have been in contact with the patient above on Oct. 1 and every subsequent day to the 5th.

3. At Christmas of the same year a middle-aged woman came on a visit to a house in this neighbourhood and fell sick

with herpes zoster on Dec. 26. She packed up and departed the same day, but her hostess, a young woman, commenced with chicken-pox on Jan. 8, which gives a reasonably accurate incubation period of thirteen days. On Jan. 22 a second guest who had left shortly after Jan. 8 also developed chicken-pox.

Chart IV.—CHICKEN-POX AND SHINGLES (I)

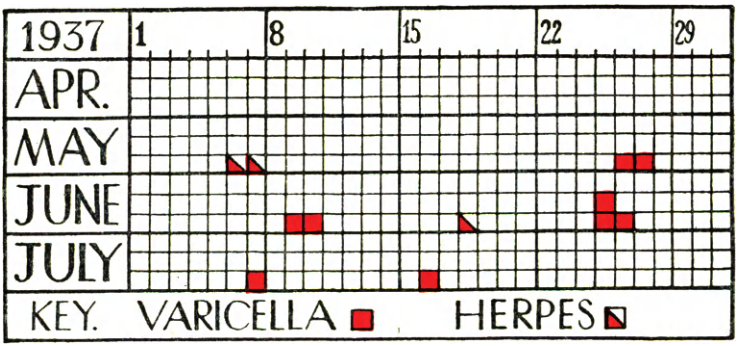


The charts of the epidemics of 1937 are reproduced in full, as, curiously enough, they began in each instance with a sufferer from herpes, and each contained another sufferer from this disease (*Charts IV, V*).

On April 27 a young married woman began with the initial symptoms of herpes frontalis. She had some pain, but the

illness was not severe and she was not confined to bed. On May 18 her baby daughter, aged eighteen months, began with lumbar herpes and also a widespread chicken-pox rash, which is a fairly rare combination. On May 31 a little girl who was devoted to this baby commenced with chicken-pox, and gave it directly or indirectly to most of the susceptibles in the village. She was only away from school a week, and this, I believe, explains the case on June 21, which comes out of its turn,

Chart V.—CHICKEN-POX AND SHINGLES (II)



suggesting that she was still infectious on the 7th. The epidemic spread to the sister village, and the whole of the sufferers appear on the chart, including one case of herpes zoster. This sufferer was an elderly woman who lived at a very remote farm and seldom left her home. Her initial symptoms commenced on July 15, and the probable source of her infection was a child of three, who visited the farm on July 4, but whose rash did not appear until the 7th. It is difficult, I find, to fix the correct day of commencement in herpes zoster, as the pain begins with a slight soreness and increases for several days before the appearance of the rash.

The second epidemic also had interesting points. On May 6 I was asked to see a married woman who was suffering

from herpes zoster. On May 7 I saw a young farmer with the same complaint in a village four miles away from the home of the other sufferer, but I found that they had an experience in common in that they both attended a sale a fortnight before at the village where the farmer lived, and had tea at the house of this man, whose wife was a friend of the first patient. It is probable that the infecting patient was present at one or both of these functions, but I was not in this instance able to discover the culprit.

May 12 was here, as elsewhere, a day of national rejoicing, and the male sufferer was present at the celebrations in his village. These took the form of sports and the inevitable tea. On the 26th and 27th respectively two children sickened with chicken-pox, and thereafter a small epidemic followed, including one sufferer from herpes zoster, who was the grandfather of one of the early patients.

The association of the two diseases is now sufficiently recognized, and there is overwhelming evidence in support of it, but it has been interesting to trace these few instances, if only to illustrate the opportunities for observation.

CHAPTER VI

SONNE DYSENTERY AND THE RARER DISEASES

Sonne Dysentery.—Serious epidemics of summer diarrhœa were very common when I first went into practice, but since the War no such epidemics have been seen, and it was not until November, 1931, that I again saw acute gastro-enteritis in epidemic form. During the last two months of 1931, crops of cases of severe gastro-intestinal disturbance began to make their appearance. The chief symptoms of these early patients were vomiting and prostration, but diarrhœa was present in some of them. In the last week of November, one little girl had the complaint in a very severe form. She was desperately ill for a week, with a rise in temperature which varied between 102° and 104°, vomiting was continuous for the first two days, and there was acute abdominal pain, with frequent bloody, slimy stools. I traced a few more sufferers in December, but the next patients I actually attended were on Jan. 4, 1932. This was at an isolated farm, and a truly deplorable state of affairs obtained. A mother and four young children were prostrate in two beds in one room. There was only the father to attend to them, and he, poor man, was in a state of bewilderment. The wretched victims were lying helpless in their evacuations and the stench was intolerable. The youngest child had added to the alarm by having a convulsion, and one of the elder had a sharper attack of bleeding from the rectum than I had previously deemed possible in such a complaint. The parents were firmly convinced that the family had been poisoned by something eaten, but it was impossible to identify the offending

article of diet, and I soon discovered that in all probability these sufferers were victims of the same disorder, the existence of which in epidemic form had been known to me since November. The mother had succumbed first, and I traced her infection to a house in one of the villages affected during the previous month. She preceded the other patients in her own house by three days, and the remaining child had a mild attack thirty-six hours after the other four children.

The village (village A) in which the mother received the complaint was the one with the defective water supply, and my first thought was that at last we should be able to state definitely that not only could the water supply be the source of an epidemic, but that it actually was. The coloured chart shown on p. 24 (*Chart I*) records this epidemic, and it will be seen that the distribution of entries does not support this theory, for the reason that the explosive character of an outbreak which follows on contamination of a water supply was not present. It was not long before I was able to trace its history. On Dec. 21 a young married woman from one of the villages (village B) took her young sister from this village (village A) where the water supply was under suspicion, to a neighbouring town on a day's shopping expedition, but returning late elected to spend the night at her mother's home. Both sisters began with diarrhœa and vomiting that evening, and it looked at first sight as if they had contracted the infection during the shopping trip, but the married sister had also been at her mother's home some days previously, and many others in this village had suffered, as I now ascertained. In whatever way they came by the infection, these sisters had the unenviable distinction of conveying the disease directly or indirectly to at least 120 other individuals, and both remained blissfully

unconscious of the part they played in the spread of the epidemic.

The younger sister must have conveyed the infection as a convalescent carrier, as the next sufferer was an adult in the same house, who began on Jan. 12, having only recently returned from a holiday. The next patient was a schoolmistress. There are many ways in which an infection of this kind can be spread in a school, but the method was clear in this case, as unfortunately the lady taught cookery, and it seems probable that she infected the food which was subsequently eaten by her pupils. These pupils conveyed the infection to their families and hence the epidemic reached the peak on Jan. 31.

The elder sister, mentioned above, was the first sufferer in her own village (B), the second to be attacked, and I have no other entry on my chart until Jan. 6, although I ascertained that in the meantime all her family had the complaint in a mild form. Seven patients with the disorder did now actually come under my care, and one of these conveyed it to the third and last village in the series. The entries on the chart are not differentiated, as both of these villages belong to the Aysgarth group on the chart. The conveyer of the disease between these two villages (B and C) was a middle-aged woman, who visited a friend in the latter village to take tea with her on Jan. 29. This friend commenced with symptoms on Jan. 31, and, as chance would have it, was the mother of a large family. Her husband and her nine children were successively attacked between Feb. 7 and 20, the delay in the appearance of the cases being accounted for by the mother's inability to prepare food until she was convalescent. Four of these children were well enough to attend school, and the epidemic followed hard on the heels of these cases, the disease

being introduced into each affected household by school-children. Families without school-children were not affected, save in two instances, where the culprit, also a child, was easily traced. A visit to the school threw a flood of light on the method of infection. Forty children attended this school and there were two privies for the use of each sex. There were two lavatory basins, the use of which was encouraged after defæcation, and two towels which were changed weekly. Little children in the throes of diarrhœa cannot be expected to be meticulously clean in their habits, and the privy seats and the long-suffering towels were probably the cause of the spread of the disease. I suspected the domestic towel in several instances earlier in the epidemic, when it was hard to realize how a chance visit to a home could implant the disease, as it undoubtedly did. All these cases were similar, and were probably due to the same organism, as the spread was so easily traced. It was made possible for me to send specimens of stools to Dr. W. M. Scott, who kindly undertook their examination, and two were collected from each village. The Sonne dysentery bacillus was discovered in all the specimens submitted, and it is a fair presumption that this was the cause of the epidemic.

Many epidemics of this disease have been recorded, especially during the last year, and it can no longer be termed a rare disease.

Clinically the disease was usually mild, although in some instances the prostrated condition of the patients was sufficiently alarming. The mildness of the complaint in most of the patients favoured the spread, as so many of the children were able to attend school.

Diarrhœa was the chief symptom, and as many as thirty-six stools were recorded in the twenty-four hours. The

stools were particularly offensive and frequently contained blood.

Vomiting was not invariable. In the epidemic recorded by R. E. Smith in a public school this was sometimes the only feature. If the earlier cases of vomiting and prostration were, as is possible, due to the same organism, they were the only instances of the disease with the absence of diarrhœa.

Abdominal pain was sometimes of great severity and was referred to the umbilical and hypogastric regions.

Fever.—Many of the patients showed no rise in temperature, but in the typical severe case the temperature was 102° or even as high as 105°, but usually only for the first twenty-four to thirty-six hours.

Headache and pain in the limbs were frequent symptoms. Some of the patients were collapsed and appeared to lose flesh rapidly, their eyes were sunken, their faces pale and drawn, and their tongues dry and brown. Tenderness of the abdomen, chiefly on the left side, was observed, and the spleen was palpable in one adult case. Relapses were seen in several instances, and although as a rule the acute stage was short, diarrhœa and colicky pains did sometimes persist for two or three weeks.

We have had several smaller epidemics of infectious diarrhœa since 1931, and in each the school-children were instrumental in their spread. Bearing in mind the suggested method of infection it seems likely that early closure of the school would bring an epidemic to an end, as children are not at all likely to convey the disease to one another by casual contact as they do those diseases spread by droplet infection. In any case, the use of a common towel should be discontinued in schools. Either washing of hands at school should be discontinued—

even now many of the more fastidious mothers forbid this procedure—or separate towels should be provided. So much is spent on education that the very small cost of providing such an obvious necessity would be negligible, bearing in mind that knowledge is not the only thing which is disseminated in these institutions.

The incubation period of Sonne dysentery appears to be about two days. I had several instances in support of this, in addition to that of the mother of the large family mentioned above in the first epidemic. In a later epidemic in 1935, seven persons in three different villages commenced with acute vomiting and diarrhœa on Sept. 12. Their experience was common in that they partook of a large slice of a particularly delicious iced cake at the tea provided at a bazaar in one of the villages. All sat at the same table, and the occupants of the table who were not victims definitely did not partake of this particular cake. As the bazaar was held on Sept. 10, this gives the same period as was noticed before. This is not the first occasion on which an *iced* cake has been responsible for the transfer of an infection of this nature, and anyone familiar with the final process of spreading the icing will readily realize how this is possible.

Undulant Fever.—I have no entries for undulant fever in these charts, but from my notes I am convinced that two patients in the past, with long-continued fever and enlarged spleens, whose illness we found impossible to diagnose, were suffering from this disease.

Glandular Fever.—Glandular fever has occurred in sporadic instances and has shown the characteristic mononucleosis, but some small epidemics, which were clinically identical with the descriptions of this disease, were apparently not of the same nature, as the blood-picture was normal.

Skin Conditions.—I always chart *pityriasis rosea* from its clinical resemblance to the exanthemata, but the numbers have been very few, and there has been nothing to suggest infection from one patient to another. During the War in a ship on a foreign station I did have two instances of this disease within a month of each other.

Erythema multiforme of the target pattern seems to be quite common in this district, and I record without comment two instances in brothers commencing on successive days.

Ringworm, contracted from the cattle in the winter months, is a very troublesome complaint, and affects both children and adults.

There have been a few instances of *erythema nodosum* with no connexion from patient to patient, although I record it in my charts, as some observers, including the late Dr. W. H. Maxwell Telling, consider it to have a specific infective origin.

The only two patients I have ever seen with *dendriform ulcer of the cornea* commenced in one village on approximately the same date, which is interesting, as it is considered to be a virus infection.

Pink Disease.—The aetiology of pink disease is obscure, and I consider observations on this complaint should be made in work of this description. I have seen six patients with this disease in this district, and the first who was attended in 1923 was, I regret, diagnosed in retrospect. A baby that was previously healthy and happy became in a short time a querulous whining infant. It lived for but three months after this, and had gangrene of all its fingers and toes, and died shortly after the tips of its nose and left ear were following suit—one of the most dreadful illnesses I have ever witnessed. The other instances have been milder, and all the patients have recovered. The only facts of any importance are that three were in one

village, and that the last, a little girl of fourteen months, was a cousin of one of the previous sufferers of four years ago.

Malignant Disease.—Malignant disease should come within the scope of this work. I have made a plan of the district in which I live, and have inserted a cross for every instance of malignant disease that has come under my notice since 1913. I find, much to my relief, that the incidence was about equal in each area. Definitely one village, which for long has been suspect, showed no greater death-rate from cancer than any of the others.

CHAPTER VII

EPIDEMIC CATARRHAL JAUNDICE

I DO appeal to all country practitioners to keep careful notes on all epidemics of jaundice. In the first place the peculiar privileges enjoyed by them that I have already emphasized are of the greatest assistance in determining the natural history of the complaint, and in the second place epidemics are much more common in the country than in crowded centres, which is certainly not the case with most infectious diseases. Not so long ago we were taught to believe that there was no such thing as catarrhal jaundice, and that all who were apparently suffering from this complaint were really victims of hepatitis. But whilst it is known to-day from post-mortem evidence that a true catarrhal jaundice does exist, it is suggested that a few of these epidemics of jaundice which have been labelled epidemic catarrhal jaundice are in reality outbreaks of infective hepatitis.

It seems to me that the study of the epidemiology of these conditions is of supreme importance in deciding this question. In my experience of one large epidemic in 1929–30 and a smaller one in 1935–6, I have seen every degree of severity, and although there were no deaths in our district, there was a fatal case in a neighbouring area from which, I believe, our epidemic originated. This patient exhibited identical symptoms to the patient who died in the epidemic recorded by Morgan and Brown. I must explain at the outset that I have no biochemical evidence to offer, as no tests for liver insufficiency have been undertaken, and if my observations are to be of any value on this debatable question, they

must rest on the epidemic behaviour of the disease and on the symptoms.

I do not know whether the same is true of all country districts, but I do know that epidemics of jaundice have constantly recurred in Wensleydale and with a certain regularity. In 1910, as a newly qualified assistant in a practice near by, the presence of jaundice in epidemic form caused me a certain humiliation from the obvious deficiency of my medical knowledge, especially as my wise old principal laughed at my ignorance and gave me accounts of other epidemics which he had seen in his long years of practice. However, I derived some comfort from a study of my text-books, as the writers of these appeared to be in an exactly similar position to myself, and did not recognize any form of infectious jaundice but a very serious form which they called Weil's disease. On inquiry into their incidence, these epidemics are found to recur about every second decade, but conditions are changing with freer communication with the outside world. Wensleydale is no longer a fortress built by nature against infection, and when I began this chapter in 1935, the second smaller epidemic was in progress.

It was probably in one of these epidemics that our village jaundice 'doctor' made his reputation. In the latter half of the last century Aysgarth boasted such a celebrity, who among various other accomplishments was a skilful castrator, and his remedy for jaundice, the recipe for which he bequeathed to his daughter, was a decoction of barberry bark, 'barberry' being the local name for the common berberis. He obtained this from what I believe to be the herb garden of Bolton Castle. It is probable that medicinal herbs were grown at these military and social centres, and possibly this shrub was planted there for its supposed medicinal properties, which were not confined to the

bark, as a jam was made from the berries which was thought to be effective in the treatment of sore throat. Another medicinal herb, *Parietaria officinalis*, pellitory of the wall, grows in the precincts of the castle and was a renowned dropsy cure, used also during living memory. Of the cures of our jaundice doctor I hear much even at the present day. What he did, he did in good faith and without hope of reward, for he charged no fee. He probably looked upon himself as a heaven-sent agent for the conquest of a disease that defied the legitimate profession, and, like so many of its own members, kept his patients in a state of tranquillity whilst nature effected the cure.

The epidemic which first aroused my interest in this disease made its appearance in Wensley in October, 1928, and marched with measured stride into almost every village and hamlet under our care. I had not read Booth and O'Kell's article in the May, 1928, number of *Public Health*, and the idea of a lengthy incubation period dawned on me very slowly; otherwise, I believe, I should have been able to trace the spread from village to village with much more accuracy than I actually did. The disease had been present for more than a year in the Catterick and Bedale areas, most of the cases being mild, but there was one death, which has already been mentioned. In that part of the valley of Wensleydale where I was able to investigate the epidemic, I estimate the population at 5700, and out of this 250 sufferers from jaundice were discovered. Of these my partner and I actually attended 118, some were not attended by a doctor, the rest being attended by our neighbouring colleagues. Such an incidence is far as as I can ascertain unique, and is hardly likely to be repeated in this district.

The story of the epidemic is a long one. When I came to realize the existence of a lengthy incubation period, the scent

in these earlier cases was stale, and, alas! my notes were not too full. However, the next patient to contract the disease was a young man in Thoralby, who often visited relations in Wensley, and whose initial date was down in my notes as Jan. 29. Only one other sufferer is recorded in this village in the whole epidemic, and that was this young fellow's niece who lived in the same house and whose date I have down as March 1, which gives an interval of thirty-one days. Askrigg was the next village to suffer and to suffer to some tune, as 32 of the total of 81 children attending the school were victims in various degrees of severity. In this village especially, however, the disease was of a mild type. During the epidemic here only five adults were attacked, one being a young school-teacher and another our eldest sufferer (79), who acquired it later from Hawes. The sister village Bainbridge remained free until April 16, when a small boy who had relations in Askrigg, and was almost daily in the village, developed the disease, and undoubtedly was the origin of the outbreak in his own centre. He attended the village school, and apparently transferred the infection to five of his mates.

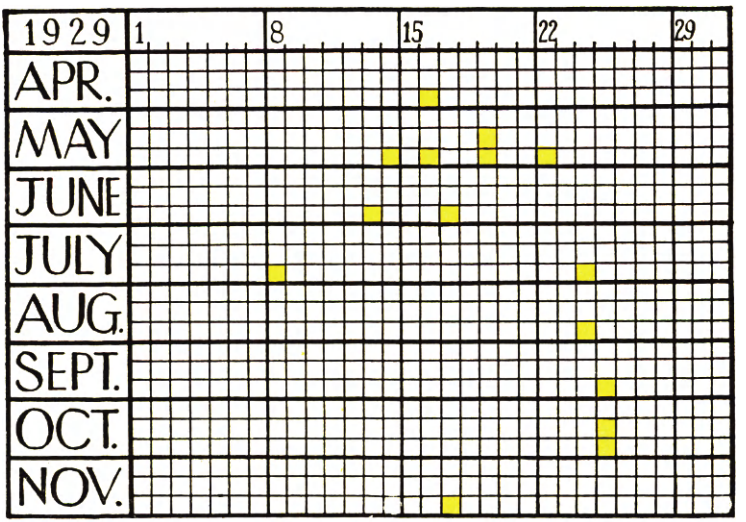
I give this visitation in full, as it strengthens the evidence in favour of a long incubation period :—

Patient	Description	Date of Commencement of Illness
The first above mentioned	Schoolboy	April 16
2nd	Schoolboy	May 14
3rd	Schoolboy	May 16
4th	Schoolboy	May 19
5th	Schoolgirl	May 22
6th	Boy aged 15	May 19

After this there was a long gap and we began to think the epidemic was at an end, but two other schoolboys began

respectively on June 13 and June 17, another on July 8, and a girl on July 24. It is, of course, not certain whether this girl was infected by the June patients or by the boy who commenced on July 8. The school holidays had now commenced, but the infection was kept alive by a man of 32, who

Chart VI.—EPIDEMIC CATARRHAL JAUNDICE (I)



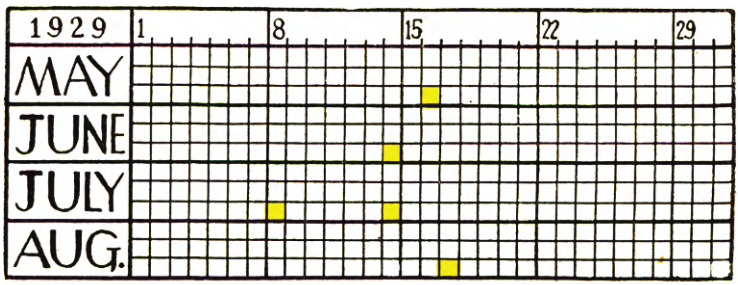
would come into contact with the children, as he was an assistant in a village shop. His illness commenced on Aug. 24, and he may have infected a schoolgirl whose date is down as Sept. 25. There is the usual monthly interval before the next two sufferers, whose date is Oct. 25. The next instance is of considerable importance from the point of view of incubation period. Having developed measles on Oct. 18, the victim, a boy, was not at school or in contact with jaundice sufferers before he commenced on Nov. 17, i.e., a period of thirty-one

days. This case also raises the point which has been suggested by other writers—Booth and O'Kell, and lately, Lisney—that there is some infection from these patients prior to the appearance of symptoms. The disease in this instance was only recognizable in the probable infecting cases on Oct. 25.

The epidemic in this village is here represented graphically (*Chart VI*).

There were several interesting little family epidemics, and one at an isolated farm commenced with the third patient in the above table, whose initial date was May 16. The five sufferers are as follows (*Chart VII*) :—

Chart VII.—Epidemic Catarrhal Jaundice (II)

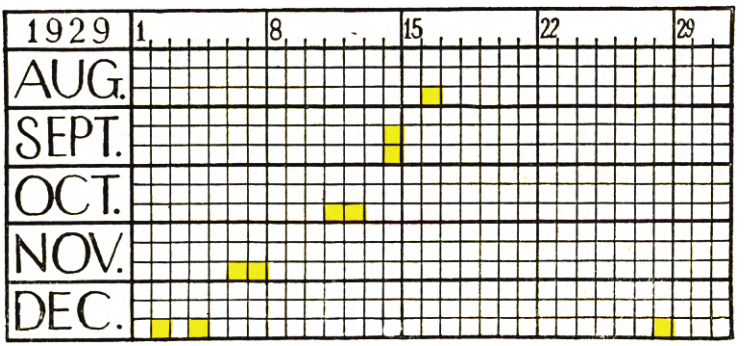


Patient	Illness Commenced	Remarks
A, aged 14	May 16, 1929	From infection at school
B, aged 16	June 14, 1929	
C, aged 12	July 8, 1929	Also possibly infected at school
D, aged 20	July 14, 1929	
E, aged 19	Aug. 7, 1929	

The time intervals between the patients in this series are respectively 29, 24, 30, and 24 or 30 days.

The second, in a village remote from Bainbridge, occurred in a family of young adults, two brothers and three sisters, and among their friends (*Chart VIII*).

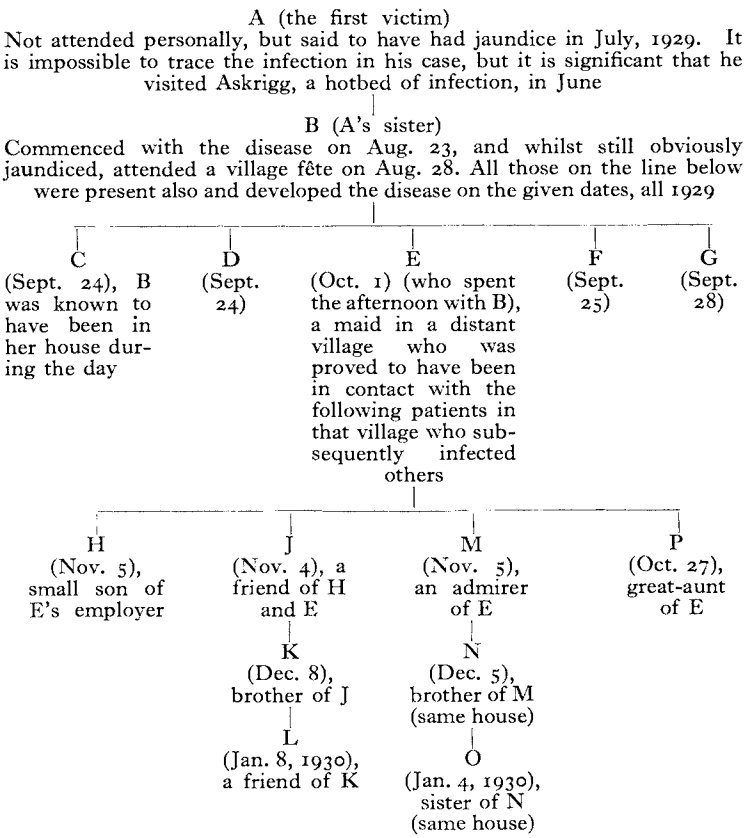
Chart VIII.—EPIDEMIC CATARRHAL JAUNDICE (III)



PATIENT	ILLNESS COMMENCED	REMARKS
A, young woman ..	Aug. 16, 1929	Infection not traced
B, young man ..	Sept. 14, 1929	Brother and sister of A
C, young woman ..	Sept. 14, 1929	
D, young man ..	Oct. 11, 1929	Brother of A, B, and C
E, young woman ..	Oct. 12, 1929	A great friend of the family, often in the house
F, young woman ..	Nov. 7, 1929	Sister of A, B, C, and D
G, little girl ..	Nov. 6, 1929	Inseparable from the family
H, young man ..	Dec. 4, 1929	Fiancé of F
I, little girl ..	Dec. 2, 1929	Two-year-old sister of G
J, man	Dec. 29, 1929	Father of G and I

The intervals here are respectively 29, 29, 27, 28, 26, 25, 27, 26, and 27 days.

Next follows what I consider my best series, especially as it includes an instance of the short and only possible exposure :—



The five names on the third line are those of the only sufferers from jaundice in the whole district who commenced in the week Sept. 24 to Oct. 1. Three of these were from the village in which the fête was held, and I found, as I expected, that they had all been present on Aug. 28. I felt sure also that I was on the track of an interesting discovery when it transpired that the other two from distant villages had this, and only this, experience in common with these three. Someone suffering from jaundice, therefore, had also probably been

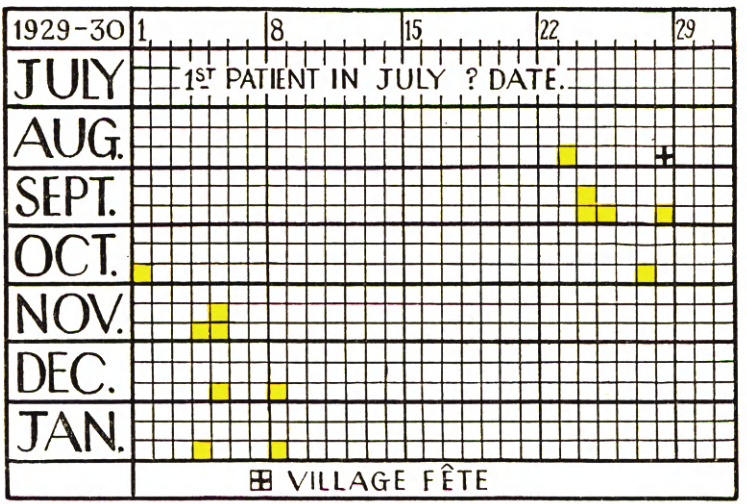
a visitor at the fête. I tried various sources, and at last, after a long search, I discovered the culprit where I least expected, almost on my own doorstep.

This was a young girl (B) whom I had actually seen in bed on the very morning of the 28th, and who I never dreamt would be able to get up that day. I have no doubt she exercised considerable skill and elusiveness at the entertainment, for I was also among the throng and did not know of her presence. This girl had as a friend another girl of 16 (E), who lived in a distant village, and these two young girls spent the afternoon together, with the result that E herself commenced with the disease on Oct. 1, and as can be seen in the diagram infected four others in this village. She was employed as a maid, and she infected her employer's small son, this boy's friend, and her own great-aunt, who lived in the village. The infection in all these was easy to explain, but in the fourth (M), a rather pathetic little fellow of middle age, it was not so clear. At last I tackled his sister, who gave him away quite shamelessly. Studies in epidemiology sometimes reveal romances. "Oh, yes," she said, "he's very fond of E. He oftens goes in at the back door in the evenings, and helps her to wash up." The brother of M in the same house commenced on Dec. 5, and the faithless sister, above mentioned, with poetic justice succumbed on Jan. 4. J, who was a friend of H and E, commenced on Nov. 4, his small brother on Dec. 8, and this small brother's friend on Jan. 8. Thus, to my knowledge, thirteen instances of this disease resulted from the determination of one young girl, jaundice or no jaundice, not to be deprived of what she considered her legitimate amusement. This epidemic is recorded graphically in *Chart IX.*

Let me quote further instances of this lengthy incubation period. In this earlier epidemic I had several more patients

in whom the disease appeared at the expected interval. In one family a small boy and girl commenced on March 17 and 19 respectively, and their father on April 17. In another family one boy commenced on June 17, the other, who went to another school in which there were no sufferers from jaundice at the time, on July 14.

Chart IX.—Epidemic Catarrhal Jaundice (IV)



A man from a village in the Leyburn district visited his brother, one of my patients, on Nov. 19 and only on that date, and commenced on Dec. 17, an incubation period of twenty-eight days.

A wife who probably received the infection at a dance on Jan. 9, as there were no cases in the vicinity, commenced on Feb. 7, 1930, and her husband began on March 7.

There were in all 40 instances of patient-to-patient spread, the intervals in which were as follows :—

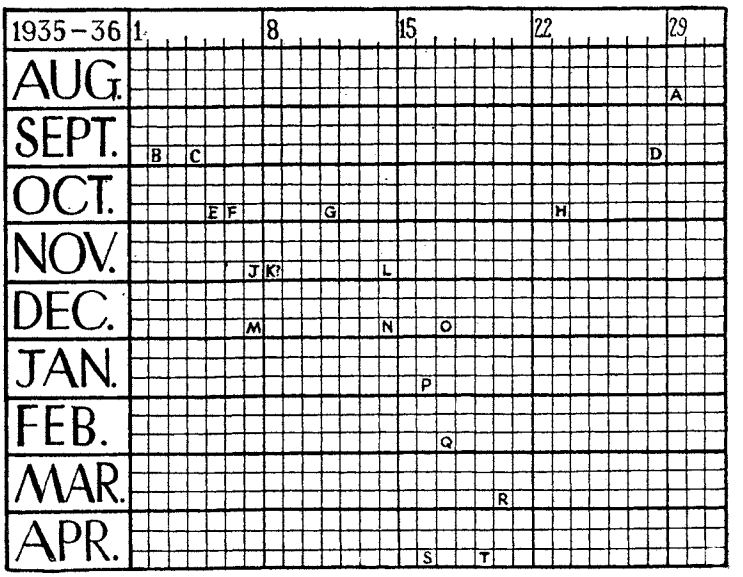
In	6	instances	the	interval	was	26 days.
,,	6	,,	,,	,,	,,	27 ,,
,,	5	,,	,,	,,	,,	28 ,,
,,	7	,,	,,	,,	,,	29 ,,
,,	5	,,	,,	,,	,,	30 ,,
,,	5	,,	,,	,,	,,	31 ,,
,,	2	,,	,,	,,	,,	32 ,,
,,	1	,,	,,	,,	,,	33 ,,
,,	2	,,	,,	,,	,,	34 ,,
,,	1	,,	,,	,,	,,	35 ,,

It is impossible to attain absolute accuracy in these results as the malady so often has an insidious beginning, but these figures suggest an incubation period varying from twenty-six to thirty-five days, thus confirming and modifying Booth's conclusion, that it was not less than twenty and not more than forty days. My neighbours, my brother, J. J. Pickles, then of Leyburn, A. W. Hansell, of Bedale, and R. N. Woodsend, of Catterick, supplied me with data of the epidemics which they observed in which the incubation periods had been similar. Confirmation, however, of this conclusion awaited my own observations, and in 1935–6 I was to witness a second smaller outbreak which conformed with the first in this as in every other respect. A chart of this epidemic is here reproduced (*Chart X*).

The first three patients under my care (A, B, and C) began with the complaint in Thornton Rust on Aug. 29, Sept. 2, and Sept. 4. They were all children, and the most likely source of infection was an Irish haymaker, who was staying in the village and with whom they were in contact. He was said to have suffered from a 'stomach upset' at the end of July. The next child, D, sickened on Sept. 28 and was probably infected by her sister, C, whose initial date was Sept. 4, although she was also in contact with the other

children. E, who fell ill on Oct. 5, F, the mother of C, who fell ill on Oct. 6, and G, who went sick on Oct. 11, were presumably infected by one or other of the early patients. The case of H, who fell ill on Oct. 23, presents some difficulty, as his brother commenced as early as Sept. 2, but he was in

Chart X.—Epidemic Catarrhal Jaundice (V)



contact with D, and if he were infected by the latter, the incubation period would be twenty-five days. At this point the epidemic so far as Thornton Rust was concerned came to an end. On Oct. 13 L, a small girl, came to stay in Thornton Rust for a week, and was in contact with her aunt, F, despite my instructions, on that and the six following days. The conviction that 'yellow jaundice' is infectious is only just gaining ground in the neighbourhood. This child lived in

another part of the dale, where there were no patients with jaundice, and developed the malady on Nov. 14, which suggests a maximum incubation period of thirty-two days. It could hardly be less than twenty-five days, as there was no known source of infection during this time. This, therefore, is an instance of the definite and only possible exposure. The epidemic also spread to Bainbridge, as some of the Thornton Rust children attend this school, D and G among them. Both these girls attended school in the initial stages of the disease and one of them presumably infected J, who commenced on Nov. 7. On Dec. 7 and 14 respectively, M and N, two young men, brothers, living at Bainbridge, sickened, and it is possible that they were infected by J, but I think it is more likely that they received their infection from a small boy in the household, K, who had a violent attack of vomiting on Nov. 8. I did not attend this patient, but it seems possible that he had a mild attack of the disease, especially as it was stated that it was the first time he had vomited in his life.

On Dec. 17 O, sister of J, fell ill, and on Jan. 16 P stayed away from school, but feeling less ill on the 17th did put in an appearance, and thereafter was absent for four weeks. The next victim, Q, therefore, could probably trace his infection to a single day's exposure, although this opinion may not be conclusive if one accepts the view that the disease may be infectious before symptoms appear. On Feb. 17 this little boy, Q, who also attended Bainbridge school, fell ill, and the disease spread to Aysgarth via the maidservant, R, in the boy's home. After leaving this farm she infected her little sister, S, who commenced with the disease on April 16. Here again I thought I had a good instance of the short and only possible exposure, as the maid-servant, R, was sent home to Aysgarth on Feb. 17, the day

on which the little boy, Q, began, because she was suffering from erythema nodosum. Unfortunately I found that she went back to the farm from March 12 to 21 to " work out her notice ", so that the evidence is not as conclusive as I would wish. However, as I am firmly convinced—and evidence will be given later to support this conviction—that the disease is only infectious for a short period, assuming infection on Feb. 17, the incubation period in this instance was thirty-two days, as she fell ill on March 20. The last patient on the chart is T, at Thornton Rust (April 19), who had only been in the village three weeks and had never been in contact with our patients. I learnt afterwards that he had been exposed to infection at a farm in Westmorland where he was previously employed, giving a *minimum* incubation period of three weeks.

Method of Infection.—No one reading these details can doubt that the disease under observation is conveyed directly from person to person. This, however, is not the conclusion arrived at by others who have had experience of epidemics, and in the most recent edition of a text-book of medicine Sir William Willcox states emphatically, respecting those seen in the Dardanelles and Mesopotamian campaigns, that " the epidemic character appeared to be due to a common cause, rather than to a spread from person to person, for infection from one case to another was uncommon. Defective sanitary conditions, whereby food is contaminated by dirt, flies, etc., and where the drinking water is polluted, strongly predispose."—(Price, *Text-book of Medicine*, 5th ed., p. 30.)

We are therefore either dealing with two entirely different conditions, or it is the long incubation period which prevented the writer of this passage from recognizing the case-to-case spread. An epidemic caused by contamination of food or water would

appear explosively over an area corresponding to their distribution. The behaviour of these epidemics in Wensleydale was entirely different and can best be explained by the assumption of personal conveyance by droplet infection.

Dr. Alison Glover, in 1931, with the assistance of Dr. Joyce Wilson, investigated a school epidemic of this disorder, and although they came to the conclusion that the transference of the disease was from patient to patient, they considered the incubation period to be three to four days. There were cases of tonsillitis in the school during the epidemic, and the writers suggest that these were probably associated with the outbreak, but this is not certain, although one of the victims subsequently developed jaundice. In the more populous parts of our own district the incubation period presented some difficulty, as it was common for the disease to commence in children a few days after their brothers and sisters or playmates, but in my opinion these children were infected a month previously by some other patient, and the few days' interval between them could be explained by slight individual variations in the incubation period.

Findlay, Dunlop, and Brown hold this view, and suggest that " when A and B succumb within four days of each other, A has not necessarily infected B, but both have been infected some weeks previously by an earlier case ".

Glover, in a private communication, tells me that he " considers there are probably two forms of the disease, one often associated with sore throat and with a short incubation period, in which the spread is almost certainly by droplet infection, and the second with a long incubation period, which is sometimes associated (as is well seen in the epidemic described by Roy Fraser in Mount Allison University) with intestinal infection, probably from food or water ". Possibly the evidence

of alimentary infection brought forward by Roy Fraser is not quite conclusive, as it depends on his assumption of a connexion between his 173 cases of jaundice and an epidemic of 600 cases of gastro-enteritis which occurred three weeks previously. Of epidemics of jaundice with sore throat as an initial symptom I have no experience, as not one of my patients exhibited this symptom, but E. M. R. Frazer records an epidemic of 25 cases in 1934 in which "all cases had one premonitory symptom in common—sore throat with fauces simulating diphtheria". He makes no note on the incubation period, but Chomet, describing an epidemic among children in Vienna in 1933, regards epidemic jaundice as a specific infection associated with tonsillitis and with an incubation period of four to five days. There are not enough details about the epidemics associated with sore throat described by E. M. R. Frazer and Chomet to form any view on the incubation period in those instances, but I am strongly of the opinion that in the epidemic described by Glover and Wilson the incubation period was a lengthy one, and I believe there is enough internal evidence in their paper to prove this.

I must refer readers to this paper, so that these extracts may be read in common fairness with the context, but it is difficult to explain the following facts on the basis of a short incubation period :—

1. A boy developed the disease in the Easter holidays several weeks after a case at the school.

2. A little girl, who had been staying in the town, developed jaundice twenty days after leaving.

3. In the summer term there is a long interval between the cases from June 9 until July 13.

Whether there are more forms than one of this non-spirochætal infectious jaundice is to my mind doubtful, but this is

one of the very problems which work on the lines I have suggested would help to elucidate. I can only say that the epidemics I have seen are remarkably true to type in their symptoms and epidemiology.

Immunity.—Looking back on my years of practice in this district, I can recall but one case of catarrhal jaundice which was not associated with these epidemics, and I am disposed to throw out a suggestion that most if not all isolated cases are sporadic instances of an infectious disease. The long incubation period is the factor which would throw one off the scent, and what appears to be a state of comparative immunity in town-dwellers. That there is such immunity seems probable. There are, we know, many cases of catarrhal jaundice in towns, but I feel certain that no epidemic of such a magnitude as our 1929 outbreak has ever occurred in any of the great cities. With a similar incidence in a city of half a million inhabitants, say Leeds, there would have been 25,000 sufferers, and it is quite clear that such an epidemic, had it ever taken place, would have caused some anxiety in the health departments and would most certainly have been recorded. In country people there is minimal protection against scarlet fever and diphtheria compared with the protection acquired by town-dwellers, and these latter must have acquired a relative immunity from epidemic catarrhal jaundice comparable with their immunity from other diseases.

In our own district there has been a freedom from outbreaks in the ' big ' houses, and I attribute this to the fact that the inhabitants of these houses spend a portion of their lives in towns and boarding-schools and thereby acquire immunity. There was one exception in the later epidemic, and that was a young man who had been considered delicate as a boy and had rarely left home, where he was educated privately. During

the early part of his illness he sat about with the rest of the household for several days until he was too ill to leave his bed, but despite this, no other member of the family, which is a large one, contracted the malady.

Age Incidence.—Another interesting finding in our 1929 epidemic was that it was by no means confined to children, as had been so often previously assumed. In 40 out of our own 118 instances the patients were above the school age and 26 of these above 20 years of age. Two veterans of 79 and 68 respectively were among the victims. In country districts, what applies universally to measles holds good, in that all those who have not previously suffered are fair game, whatever the age. The school, as so often in infectious disease, provides the opportunity for infection.

Second Attacks.—I am, perhaps, a little premature in assuming that protection is afforded by a previous attack, but no instance of a second attack has come under my notice, and there have been ample opportunities of infection. The latest epidemic, for instance, at the time when this chapter was written, was passing through some of the same villages as the 1929 epidemic and notably skipping those patients who had the disease previously.

I had one instance of relapse after what appeared to be complete recovery. This was in a woman of 29, whose attacks commenced respectively on June 17 and Sept. 20, 1930.

Infection at School.—As I have said before, school is much pleasanter for the present generation than it was for its predecessors, and those in authority are very averse to casual absentees, so that epidemics are spread because children mildly affected do not remain away from school. In these epidemics it was quite a common thing for a child to remain away only a few days, and there is no doubt that such cases helped materially in

the spread of the infection. Just as in measles, there is a period after the first symptoms when the little sufferers do not feel so ill, and when some are able to resume school, before the advent of jaundice about the fourth day.

Duration of Infectivity.—It is essential to know the length of the period after the onset of a disease in which a patient remains infectious, and it is a question requiring an answer that is often put to the family doctor. In this disease, I believe, I have evidence of a relatively short period of infectivity.

This disease has an astonishing behaviour in families—and in small villages which are almost like large families—which has no counterpart in any other disease. There is what may be termed a serial incidence, and the only explanation that I can give is that the disease is not exceedingly infectious and is only infectious for a short time. There was little attempt at isolation in our first epidemic, as the infectious nature of the disease was not recognized and my instructions were not carried out, so that only on the basis of a short infectivity period could this serial incidence be explained. Findlay, Dunlop, and Brown also comment on this, and give a good instance: "A boy, aged 12, returned home for the holidays from his preparatory school, in which cases of jaundice had occurred, and at once went sick with a typical attack of catarrhal jaundice. Four weeks later his small sister, aged 8, developed the same disease; the father sickened thirty-one days after his daughter, the mother thirty days after her husband."

Reverting to my second family epidemic, on p. 67, A, a young woman, was the original sufferer, and B and C commenced, as we should expect, a month later. Why, however, were not D and E stricken until a month later, and F and G a month after this, as to my knowledge they were all in contact with A on

Aug. 16? There could be no periodicity in the appearance of the cases, as there invariably is, if patients were infectious for a prolonged time. Dr. Ralph Bates differs from me and believes sufferers should be isolated for a month, but he was investigating an epidemic in an institution where the infecting case is not a matter of certainty. I have not seen any other observations on the duration of infectivity and cannot myself put it into absolute figures, but I believe it to be about a week.

The guilty one in the village fête incident had had the disease for five days, and the little girl who was infected by her aunt in the later epidemic was first in contact with this latter when she had been ill for a week. I have no striking evidence to prove the short duration of infectivity, but I have always allowed the children who were sufferers, if they were well enough (as most of them were), to return to school at the end of a fortnight, which allows, as I believe, ample margin, and have had no instance of infection after their return. This, of course, was largely an experiment, as the duration of infectivity was not known, but it does appear to give support to what I have inferred from the behaviour of the disease in families.

Degree of Infectivity.—There is something to be said on the degree of infectivity, as close contact seems to be necessary. In one family a boy infected his elder brother, whose bed he shared, and his little sister; his father and mother escaped. In another family two grown-up girls, who also slept together, developed the disease on March 21 and April 19 respectively. No other members of the household, which is a large one, were infected. Wives almost invariably infected their husbands, and in more than one instance their children escaped. Husbands curiously enough did not infect wives, for which there may be a very human explanation.

Clinical Features.—As mentioned above, having had under my care 150 patients suffering from the disease, I have seen every degree of severity, from the mildly affected, in whom *jaundice* was the only symptom, to those whose lives were seriously threatened. On the whole the patients exhibited symptoms which fitted in exactly with the text-book description of catarrhal jaundice, and no anxiety was felt in the majority of instances. There was often a pre-icteric period, commencing with headache and vomiting and abdominal discomfort which amounted to pain in some patients, and lasted about four days. In some instances the initial day was the worst, and, in children, the subsequent period before the appearance of jaundice was free from symptoms, so that the child returned to school, a significant factor in the spread of infection, as mentioned before.

Hurst divides these cases into a true catarrhal jaundice and a primary hepatic necrosis, and thus describes the symptoms of the latter :—

" In most cases there are no pre-icteric symptoms of any kind. The patient notices that his urine is becoming dark and subsequently that his stools are pale and jaundice then appears. The onset of jaundice is accompanied by symptoms of general toxæmia—anorexia, headache, and weakness, but occasional vomiting and diarrhœa. The temperature generally is slightly raised. There is no epigastric tenderness, but the liver is tender and slightly enlarged, and the spleen is always palpable. The jaundice is generally less marked than in catarrhal jaundice and bile is always present in the stools. The jaundice lasts between a week and two or three months, its average duration being greater than in true catarrhal jaundice. Instead of the rapid complete recovery which is characteristic of catarrhal jaundice, convalescence is prolonged and the patient may become very weak and emaciated."

Now, I have in mind a patient whose symptoms were identical with those which Sir Arthur Hurst describes above, but he was infected by his children in the first epidemic which I have described, and subsequently infected his brother, who developed a mild attack of the disease, which would certainly have been classed with the children's illness as true catarrhal jaundice.

Hurst also quotes under this heading Morgan and Brown's fatal case, which admittedly occurred during an epidemic of catarrhal jaundice, and although there were post-mortem findings negative to obstructive jaundice, epidemiologically no distinction could be drawn from their other cases. He also quotes Wallgren (1930) who observed three fatal cases in the course of a big epidemic in Gothenburg, but here the illness in each instance began with vomiting and abdominal pain, although no changes were found in the bile-ducts or duodenum after death.

The rapidly fatal case in the Bedale area occurred in the 1927 epidemic, which, I believe, was the forerunner of the epidemic in 1929–30 in our district. I feel disposed to suggest that these severe and fatal cases are simply fulminating instances of the same disorder. In influenza epidemics it is hard to recognize as sufferers from the same disease the patients with 'heliotrope cyanosis' and those who suffer from the complaint in the mild form with which all of us are familiar, but it is an undoubted fact that both forms of the disease may occur in one home, and it is realized that they are aetiologically and epidemiologically identical.

What should be done—and I unfortunately have not had the opportunity to do it—is to obtain a report as to whether hepatic insufficiency is present in these patients some years after the attack. Are such patients fit subjects for chloroform

or evipan anæsthesia, and are they likely to develop hepatic cirrhosis if they indulge too freely in alcohol? One of my early teachers, the late Dr. Thomas Churton, of Leeds, used to hold that there was no alcoholic cirrhosis in patients who had not previously contracted syphilis, but it is possible that a condition such as catarrhal jaundice could damage the liver in the same way so that alcohol in large amounts might more readily lead to such a condition.

What we country practitioners can be expected to do is to try to determine on epidemiological and clinical grounds whether they are two conditions, or if one is a malignant form of the other. In Bergstrand's epidemics, reported from Sweden, the symptoms in his cases of acute yellow atrophy were, to begin with, similar to those of epidemic catarrhal jaundice, and he himself apparently believed them to be instances of the same disorder, but of vastly different severity.

The writers of text-books do not stress *pain* as an important symptom in catarrhal jaundice, e.g., "The patient complains of epigastric discomfort, which rarely amounts to pain" (Price). In many of my patients this symptom could not be dismissed so summarily. On the contrary, it has led to very real anxiety, especially if it occurred before the appearance of jaundice. Several of the young patients showed this symptom early, and it seems opportune to quote my notes on one of them :—

"M. T., a little girl, aged 9. Not well for some days, kept from school for a cold, said to have had congestion of nose and slight cough. These symptoms are probably not relevant, as other members of the family had colds.

"*Oct.* 31, 1929.—Seen for the first time. Temperature 103°, severe pain upper abdomen; tenderness epigastrium, no

rigidity; has vomited several times. B. N. O. two days; urine normal in colour, no sugar, no albumin.

"*Nov.* 1.—Temperature 102°, said to have been rambling all night; less pain, vomiting still severe and nothing retained; normal stool.

"*Nov.* 2.—Temperature 100°, vomiting still severe but less pain.

"*Nov.* 3.—Temperature 100°, grey stool passed, urine dark colour; no pain or vomiting.

"*Nov.* 4.—Normal temperature, jaundice appearing in conjunctiva.

"*Nov.* 5.—Considerable epistaxis."

Jaundice was still present on Nov. 26 and the child languid and far from well. I do not believe, apart from the presence of an epidemic, that the condition could have been correctly diagnosed before the 3rd.

But these instances in children did not give the anxiety that we experienced in four of our adult patients, who presented symptoms which had an extraordinary resemblance to those of acute surgical abdominal conditions. The following quoted from my paper in the *British Medical Journal* shows the difficulty of diagnosis:—

"H. A., a farmer, aged 35, on April 17, 1929, complained of indigestion. On April 21 he was slightly jaundiced, but said he felt better and asked to be allowed to take a short walk. This concession was construed into a tramp of several miles, including a climb of 500 feet, to see his sheep. On April 22, at 7 a.m., an urgent message was received to the effect that he had had severe abdominal pains for several hours, and had vomited once. He was found to be collapsed, with a feeble and rapid pulse; the face was blanched and pinched. There was tenderness in the epigastrium. The abdomen was full

but not rigid ; liver dullness was present ; the bowels had not been opened. His condition gradually improved, but he was watched anxiously for several hours, and a diagnosis of perforated duodenal ulcer was seriously considered."

The other patients showed similar symptoms, and my neighbour, Dr. E. L. Hughes, of Hawes, gave me notes of a patient who caused him anxiety in this way before the advent of jaundice. It therefore would not surprise me to hear that abdomens have been opened for these conditions on the assumption that perforation had taken place. As we remarked at the time, the distance of forty miles from hospital and surgeon was for once in the patient's favour.

The amazing sequel to the illness quoted above was that, on the last day of 1935, nearly seven years after this, I was called to see H. A., who this time actually had a perforated duodenal ulcer for which he was operated on and made a good recovery. His history of digestive symptoms dated back to his attack of jaundice, and I have another instance of duodenal ulcer in a man of 30, who had severe hæmatemesis and melæna and who also dated his symptoms from his attack of jaundice in this epidemic.

Enlargement of the liver was only made out in a small proportion of the cases (16 out of 118), and I only felt the edge in four of these, but so many of the cases were mild that this might be expected. All the severe cases showed enlargement. I did not feel an enlarged gall-bladder during the epidemic, but I felt the tip of an enlarged spleen in two patients.

Rashes were rare, but did occur. One boy of 8 had extensive urticaria, commencing three days before the appearance of jaundice, and a man of 35 had an urticarial rash affecting the lower part of the trunk and the lower limbs, which appeared

a week after jaundice had manifested itself. A young woman had an extensive and symmetrical petechial rash, beginning in the lumbar region and spreading forward on both sides into the groins. Medical assistance was obtained owing to this, and jaundice did not appear for three days. Scattered petechiæ were present in two other patients. In 1935 I saw a young man with one of my neighbours who had a rash resembling German measles, and was surprised to hear that he had developed jaundice two days later. A rash of this nature, which I frankly diagnosed as German measles, appeared in a small boy whose two sisters were victims of jaundice in our second epidemic. He had no symptoms pointing to jaundice, but the diagnosis of German measles was incorrect, as there were no other cases at the time, and his brothers and sisters, who were all susceptible, not having had the disease, did not succumb. Such rashes have been noticed by others, notably by Dr. J. L. Dunlop, who very kindly allowed me to read his M.D. thesis on this subject.

In the first epidemic, as I have mentioned, I had the help and pleasant co-operation of Dr. W. A. Lethem of the Ministry of Health. At that time it was thought possible that these epidemics were of spirochætal origin, and a report by Morgan and Brown had been published in 1927 by the Ministry of Health on epidemics in a number of villages in the midland and eastern counties in which this connexion was discussed.

By the courtesy of Dr. Lethem, blood, urine, and naso-pharyngeal swabs were examined, but with results entirely negative, although one quite unforeseen catastrophe occurred, for the distinguished bacteriologist who examined the blood was himself apparently infected from it. This incident is described in Findlay, Dunlop, and Brown's paper read before

the Royal Society of Tropical Medicine and Hygiene, and I feel it is worthy of quotation :—

" On Dec. 6, 1929, one of us received through the Ministry of Health sera taken from cases of epidemic catarrhal jaundice from the outbreak described by Pickles (1930). During the following week the sera were examined for the presence of antibodies to *L. icterohæmorrhagiæ* by the adhesion test with uniformly negative results. The sera remained on the laboratory bench for at least ten days after their arrival.

" On Jan. 16, 1930, this investigator was taken ill with vomiting, epigastric tenderness, hyperpyrexia, and conjunctival congestion. Prostration was out of all proportion to the other symptoms, while insomnia was marked. During the first week there was present an erythematous rash, and from the fourth day the urine became darkly bile-stained and the stools clay-coloured. A moderate degree of icterus of the skin and mucous membranes was present during the second week. The urine contained a trace of albumin at this period. The temperature, which at first had risen to 103° F., gradually fell, returning to normal by the fourth day. The differential leucocyte count was similar to that found in other cases of epidemic catarrhal jaundice, cultures of the blood remained sterile, while the stools did not yield a growth of any non-lactose fermenting organisms. Examinations of the blood and urine for leptospira were negative, and after recovery the serum failed to show the presence of any antibodies against leptospira. Although it is not possible to prove definitely that the patient was infected in the laboratory, the evidence is nevertheless fairly conclusive in that he was the only member of the laboratory staff to work with the sera from the Yorkshire cases and the only member to fall ill ; nor was he in contact with any known case of jaundice outside the laboratory."

Animal experiments were undertaken by Findlay, but neither in earlier epidemics nor in my late epidemics was he able to reproduce the disease in laboratory animals, although blood and nasal washings from an early stage of the disease were sent to him for this purpose.

The question is still *sub judice*, and it remains to be seen whether the efforts of other country practitioners will be able to pronounce for unity in these epidemics of non-spirochætal jaundice, in which it would appear that epidemiological observations are of supreme importance.

CHAPTER VIII

EPIDEMIC MYALGIA

EPIDEMIC myalgia is a disease with a striking, definite, and alarming syndrome, which has been described independently in various countries and labours under the disadvantage of a multiplicity of names. It is only lately that it has been realized that the ' devil's grip ' and ' Bornholm disease ', to quote two of these names, were, with many others, titles applied to one and the same disorder. My own original experience of this complaint left me with a vivid memory of a period of considerable anxiety, when my partner, the late Dr. Dean Dunbar, and I watched a succession of sufferers from what we realized must be an infectious disease, and one which undoubtedly we had never seen or heard of in our lives before. Our anxiety was indeed great, as the patients appeared to be extremely ill, and we could give no sort of prognosis, for we were dealing with a disease the nature of which was entirely unknown to us. Accounts of this disease under my name have already appeared twice in medical papers, but I feel so sure that many other general practitioners will at some time have similar unpleasant experiences with this disease, that I propose for their assistance to repeat and emphasize the story of our first little epidemic. I hope I shall succeed in reproducing the atmosphere of utter helplessness which prevailed before a diagnosis was forthcoming.

In the early morning of a bright July day in 1933 I was roused from my bed by a young farmer who, I knew, was of a placid disposition and gifted with common sense, but who on this occasion was thoroughly alarmed. He asked if I would

come to one of his small boys who had been taken seriously ill. This boy, aged 2½ years, had been quite well and lively whilst being dressed, but was then attacked suddenly with pain in the upper abdomen, sweated profusely, and was thought by his mother to have had a fit. When I saw him the pain was not so acute, but he was limp and deadly pale and looked extremely ill. He was taking short shallow breaths, which were obviously causing him discomfort, but at this stage his temperature was only 98° F. Later in the morning my partner saw him in a return of the acute pain, and suggested that the trouble was a painful spasm of the diaphragm. This was a very acute clinical observation which helped us materially in the final decision on the identity of the disease. We saw him together at 3 p.m. and again the picture was changed. His face was flushed, his temperature was 101°, and his respirations were definitely 60 per minute. The respiration rate, we knew, was most unusually high, and neither of us could remember counting such a rate, except in pneumonia patients who were obviously not going to recover.

The boy was lying in a dazed condition, taking no notice of what we were doing as we examined him, his alæ nasi were working, he had an expiratory grunt and a short cough.

At this point we felt we were on firmer ground and were justified in suggesting to the parents that the child was commencing with acute pneumonia, although there were no physical signs of this disease. I still think and believe the reader will agree with me that this was a very reasonable attempt at diagnosis, and many of our patients have at some stage of this perplexing malady had a similar appearance. In the evening he seemed slightly better, which added somewhat to our difficulties if at the same time it added to our peace of

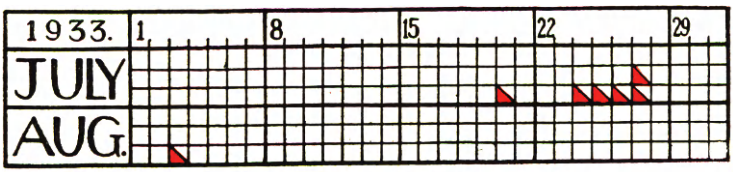
mind. His temperature had come down to 100°, he appeared to have lost his respiratory distress, and he had no pain. The next morning it was obvious we were dealing with a strange disorder. The little rascal, standing on the window-sill and thumping on the pane, greeted me smilingly, but, I thought, derisively, as I walked up the garden path. I examined him carefully and could find nothing to account for the happenings of the previous day. I told his mother, without beating about the bush, that I had not the slightest idea what had been the matter with her child, but that he was quite well again and that she need not worry any more about him. This was an extremely rash remark, as I was to learn to my cost later, for the next morning I found the boy in very much the same condition as he was on the first day of the illness, and he had several hours of similar distressing symptoms, with the addition of pain in the back, which prevented him from raising himself in the bed. The next day he had a ' bad cold in the head ' and his evening temperature was 99·8°, but he soon afterwards completely recovered.

The family consisted of father and mother and three little boys in addition to the first victim, and the boon companions of the boys were three little girls who lived on the other side of the road. Two of these were bending over the little sufferer's couch with interest and solicitude depicted on their features on the very first day of his illness. I told the mother that these young women would be better to remain in their own home until we had decided what was the matter with her own child and they were packed off. I little thought that the damage had already been done. To cut a long story short, and to avoid wearisome repetition, as the symptoms of the others were very similar to those of the first patient, it is sufficient to state that two of the brothers were attacked on

the second and third days respectively of the first boy's illness, and the two little girls on the fourth day (*Chart XI*).

We were, therefore, dealing with a small epidemic of infectious disease of very definite syndrome, but of which our text-books told us nothing, and when we thought the epidemic

Chart XI.—EPIDEMIC MYALGIA: THE FIRST OUTBREAK



was at an end we sat down in our consulting room, recalled all the symptoms, and wrote the following summary :—

1. Onset with very acute spasmodic pain in the upper abdomen, accompanied with profuse sweating. All the children placed their hands over the xiphisternum when invited to indicate the site.

2. Rapid, shallow respiration, obviously extremely painful. Pain on yawning, which was present in some of the children, and on deep breathing or laughing between the spasms.

3. Fever up to 103°, rapidly subsiding, but tending to rise again with a return of the pain about the third day and again on the fifth or sixth in some of the patients.

4. Complete absence of vomiting. Tongues coated, three of the white strawberry variety. No diarrhœa.

5. No faucial injection, but nasal catarrh in one child and unilateral conjunctivitis in another.

6. A trace of albumin in the urine of one child.

7. Pain in the knees in another.

8. No rashes.

9. Complete recovery in from four to six days and an absence of sequelæ.

The spasmodic nature of the pain was most marked. The mother of the little girls told me that one of her children, whilst playing contentedly with her toys, would suddenly get up and rush to her in the same way as a child suffering from whooping-cough will rush to its mother, thoroughly frightened when it realizes an attack of coughing is imminent. Sylvest mentions the same abrupt onset of the spasms, and tells how his own little boy threw himself to the ground in his agony.

Four days after their complete recovery the father was the final victim of the disease. He commenced late at night with a pain in his left shoulder, but paid little attention to this, and went to bed and had a good night. The next morning he was awakened by severe pain along his costal margins and in his arms, was stiff and sore all day, but managed to crawl about and do his work. At six in the evening, being, as he said, at the ' far end ', he had a profuse sweat, the pain disappeared, and he had no further symptoms during that night or the succeeding day, but on the day after he complained of a feeling of stiffness in his shoulders and ribs. He definitely decided he could not drive his motor-cycle and rode pillion behind a friend. For the rest of the day he had great pain in his lower ribs, intensified on taking a deep breath. He went to bed at 8 p.m. and felt ' burning hot ', sweating profusely later. He had a wretched night, with pain in the epigastrium and costal margins, and a very severe headache, and also had pain in the neck at the level of the thyroid. I saw him for the first time the next morning. He is a typical dalesman, who hates to be ill and dreads calling in a doctor lest he should be sent to bed. I jokingly railed at him for the concealment of his illness, when he knew very well I was most anxious to know

more about this little epidemic. What had I done, I said, to be treated like this after looking after him and his family for so many years and bringing all his children into the world. The symptoms, however, were still fresh and vivid in his memory, and I believe the above to be a true account. He was distinctly tender over the lower ribs of both sides and in the epigastrium. The spasmodic pain indeed was wearing off, but he still complained of feeling dizzy.

Two problems had now to be solved: Where did this strange disease come from, and could we give it a name? The first was partially answered immediately. Four days previous to the appearance of the disease in the first of these youngsters two children were brought from the York neighbourhood to spend the day at the farm. The day's treat was no 'fun' for the elder, a little girl, who spent it sobbing with pain, doubled up on a sofa, and although I did not see her I have no doubt that she was the infecting patient. All attempts to trace the origin of the disease further failed, possibly because the little girl's mother, scenting blame for herself, shut up like a clam and would give no further help. I must admit that in my inquiries into the spread of epidemics I have seldom encountered this attitude, and have more often come across the helpful than the obstructive outlook.

The second problem was much more difficult, and appeared insoluble unless we were to assume the presence of a definite and entirely new infectious disease. Finally it was solved completely. I had the good fortune during the previous year to be in correspondence with Dr. Ejnar Sylvest, a general practitioner in Copenhagen. We had both been interested in epidemics of catarrhal jaundice, and he very naturally sent me articles of a condition which he called 'myositis epidemica' or 'Bornholm disease', and asked me whether epidemics

of such a disease had ever come under my notice. At the same time he made a prophecy that if they had not done so already, they most certainly would. I was unable to read his article in Danish and completely forgot about the condition until the epidemic appeared. I then searched for his papers, and although I could not read them, his references to papers on epidemic pleurodynia, epidemic pleurisy, and most of all to epidemic transient diaphragmatic spasm, made me suspect that I was on the right track. A copy of his paper in French, submitted to the Office d'Hygiène Publique and sent to me by Dr. Alison Glover, whose help in these matters I have already acknowledged, and to whom I suggested this solution of our difficulties, settled the matter beyond a shadow of doubt.

An account of these cases was published in the *British Medical Journal* somewhat thoughtlessly under the title of " Bornholm disease ", and this name received considerable comment. I was soundly rated by certain eminent members of our profession for applying the name of a beautiful island to an unpleasant disease, and it was pointed out, quite rightly, that another island, Malta, had suffered from a similar association. In extenuation of my offence I must plead that up to that date there was no appropriate name for the disease, and that after all the name ' Bornholm disease ' emanated from a Dane.

Sylvest himself writes in his book on this subject : " Here in Denmark this popular name of the disease has become so established and comes so easily to the tongue that it would probably be very difficult to have it changed." In the past, diseases, especially those contracted venereally, have been named rather maliciously after the country of their reputed origin. Only the other day in Wensleydale I heard scabies referred to as ' t'Frenchman ', a survival from a bygone age

of our judgement on our neighbour's morals; and the term 'Englische Krankheit', which has probably provided much amusement in the country where it is in use, is no doubt equally unfair to ourselves.

The term 'epidemic myalgia' appears to be quite suitable, and should be associated with the name of Sylvest, as his descriptions are by far the most complete. To him also belongs the credit of identifying the disease, given such diverse names in many countries, with the condition with which his large personal experience has made him familiar.

His historical review of the disease goes back to 1856, when Jon Finsen observed the condition in Iceland, but did not publish his findings until 1874, whereas in Norway it was described by Daae in 1872.

The latter's description of the symptoms, reproduced by Sylvest, is worth quoting: "As a rule the patient has a stitch in one side of the chest, most often without any precursory ailment, but sometimes after an attack of chills; the stitch is often accompanied by pains in the back, shoulders, epigastrium, and abdomen, and these pains are described sometimes as oppressive, sometimes as shooting or aching; less frequently they are felt also in the back of the head, neck, legs, arms, and even in the fingers. There is considerable difficulty in moving the affected parts, especially the chest, therefore the respiration is laboured, sometimes to such an extent that the patient feels as if he is being strangled. Usually the general condition is greatly affected. There is as a rule some headache, pyrexia, and thirst, and the bowels are sluggish. The tongue is generally coated, the pulse normal or a little frequent. There is seldom any cough, so cough does not appear to go with this disease, and physical examination of the chest reveals no abnormality." He remarked on the

great difference in the severity of the disease in different patients, and believed it to be a contagious form of muscular rheumatism.

In the United States Dabney, in 1888, was obviously writing of the same disorder when he published an account of an epidemic illness, resembling dengue, which had received the local name of the ' devil's grip '. After a long interval it was again described several times in the States, and in 1924 in England three epidemics of what appears to be the same condition were recorded respectively by Bruce Williamson, by Lloyd, and by Attlee, Amsler, and Beaumont as ' epidemic pleurisy '. This disease was in many instances associated with a pleuritic rub, which is not a physical sign noted by Sylvest, and which has not been observed in any of my cases, but the symptoms are otherwise so similar that it is safe to conclude that these writers were describing Epidemic Myalgia.

The remarkable epidemics of what has been named ' Haffkrankheit ' and which affected mainly fishermen on the shores of the Frisches Haff, a narrow gulf communicating with the Baltic, are considered by Wolter to belong to the same family, although there was an important difference, namely, a substantial mortality among the sufferers from the disease which he describes. Professor Major Greenwood, to whom I am indebted for this information, tells me that Wolter identifies the new epidemic with an outbreak in 1529 in the Haff of Stettin—an outbreak which was part of the epidemiological phenomenon known as the ' English sweat '. Wolter attempts to elucidate the aetiology from the standpoint of the theory formulated by Sydenham, and expanded by Pettenkofer, that epidemic disease is conditioned by place and time. It is, however, difficult to treat seriously his doctrine of the miasmatic origin of the malady he describes.

As Sylvest and others have seen it, and as I have seen it myself, epidemic myalgia is of importance only as a mimic of well-known dangerous conditions, but the resemblance to this more serious malady is close, and it would be imprudent to conclude that future appearances of the disease under discussion may not have a more ominous significance.

In 1933, after preliminary papers, Sylvest published an exhaustive account of the disease under the title of *Den Bornholmske Syge, Myalgia epidemica,* with an English summary, and in the following year he also published a somewhat smaller work in English (Humphrey Milford, Oxford University Press). After my own paper appeared in November, 1933, Dr. A. H. Carter, who is the school doctor at Sedbergh, wrote an interesting account in the *British Medical Journal* of a similar epidemic which occurred in the school in October, 1929, and which he had no difficulty in identifying in retrospect.

My own experience of this disease is limited to 31 patients, of whom 15 have been children under 11 years of age, which is not vastly different from the proportion in the 93 recorded by Sylvest, 46 of whom were under the age of 15. All my other patients were young adults, with the exception of a man of 52, who presented the disease in a mild but typical form. From my own observations the malady has a much more serious appearance in children than in adults, and its intermittent character allowed the latter to a large extent to follow their regular employment.

My justification for recording epidemic myalgia so fully, apart from its undoubted academic interest, is its close simulation of well-recognized serious conditions.

In illustration of this, I need only give a striking if somewhat nonchalant quotation from Crone and Chapman recording an epidemic in the Massachusetts General Hospital: "The

greatest difficulty lay in deciding that the patient did not have an acute abdominal disease of surgical nature. Two exploratory laparotomies were done with the pre-operative diagnosis of acute appendicitis, but a normal appendix was removed in each. In a third patient a perforated duodenal ulcer was suspected, but exploration showed a normal abdomen."

To prevent similar surgical incursions, it appears to be very necessary for the symptoms and signs of epidemic myalgia to be thoroughly grasped. It is a disease in which diagnosis only is of importance. As I have said before it is one of those molehills which has a very striking superficial resemblance to a mountain, but if the diagnosis is clear, it is very satisfactory to be able to state confidently that however alarming and painful the symptoms may appear to be, the patient is in no danger and the disease has no death-rate. After the first epidemic I have been able to take this stand in four subsequent outbreaks, and it has been a great relief not only to the patient's relatives, but to myself.

In 1933 the disease in Wensleydale was by no means confined to the cases with which this chapter begins, but I could trace no connexion between the early and the later outbreaks. Late in August, on a Saturday afternoon, a baby, a little boy from a distant farm, was brought into our surgery with a history of sharp spasms of abdominal pain. His mother said he was tender in the left of the abdomen and demonstrated this to me unequivocally by a not too gentle pressure two inches below the costal margin, which caused the child to draw up his knees and howl pitifully. His temperature was 101° F., and he had more than a trace of albumin in his urine. I said at random to our *locum tenens* that here was another case of Bornholm disease, really thinking that the child

was suffering from renal colic. That this was one of those true words spoken in jest the sequel proved. I told his mother not to take the child home, but to stay for some hours at a relative's home in our own village, so that I could see him later in the day—pardonable instructions, but disastrous in view of the nature of the complaint. The child was not so ill in the evening, and was quite well on the Sunday, but on the Monday morning, when I visited him, was in the same condition as he was when his mother brought him into the surgery. After this he completely recovered.

On the Saturday following I received a message from our district nurse that she thought the relative's little boy had appendicitis, and it required some discrimination to decide that this was not the case. He had a temperature of 100° and definite tenderness and rigidity on the right side of the abdomen, but—useful facts—he had not vomited, and his respiratory rate was fifty to the minute. There had been similar but less alarming symptoms on the Thursday, but he was quite well on the Friday. He gradually improved on the Saturday, and in the evening I was sure he was not suffering from appendicitis and began to suspect the nature of the malady. The next day he was running about without a pain or care in the world. The diagnosis, not only of this case, but of that of the baby, was now as clear as daylight, and, having gathered wisdom from previous experience, I warned his mother of a probable relapse on the next day, a warning which was completely justified, as the little fellow had another very similar day of illness ending in a profuse sweat, which terminated his troubles. The baby's mother had meanwhile returned home, but on inquiry I found that she had a few days' illness, beginning on the Thursday, of a very similar nature to that of the children.

The succeeding cases in 1933 were in male adults, all young except the father of one of them, a man of 52 whom I have mentioned before. These patients had the disease mildly, but one of them came back from his work walking in a doubled-up position, and painful yawning was present in all the cases. At this time a man of 50, who had been in contact with these patients at the local inn, developed a soft painful swelling of his right testicle of short duration, which is interesting, bearing in mind this association in the Swedish cases recorded by Huss.

Later on in the year, waiting, as a late literary neighbour of mine, Dr. Bishop of Kirby Malzeard, expressed it, for a 'moorchick to hatch', I found out that the disease had attacked three young fellows on the farm, at which I was compelled to remain several hours, and so had ample time to listen to their story. The infection reached them during the strenuous days of 'haytime', and they courageously carried on, the worst sufferer at the time being allotted the easier work on the mower or sweep.

In September of the following year several young adults in one village complained of ill-defined upper abdominal pain of an intermittent character, but I was never able to witness an attack in any of them. A few days afterwards I was summoned hastily to see a boy of 10 in a state of painful diaphragmatic spasm, which was identical with the condition observed in the previous sufferers in 1933, and I found that he had had a much shorter and slighter attack two days before this.

Dr. Alison Glover informs me that he investigated an outbreak in a residential girls' school in October, 1934. The epidemic began abruptly, and despite admirable environmental conditions, had the explosive character often seen in school

epidemics of influenza, and of 202 girls (aged 13 to 18) 79 (39 per cent) were attacked, 63 in the first five days. The "symptoms corresponded closely with those described by Sylvest, but vomiting did occur in one or two cases and the medical attendant had detected pleural rubs in two. Sore throats occurred in two cases, but apart from this the absence of nasopharyngeal catarrh was striking. The younger girls had the heavier incidence. Sweating was usually profuse, and a recrudescence of the pyrexia on the fifth day was a common feature. Eight of the teaching and domestic staff were attacked."

No patients with this complaint came under my notice in 1935, and the only case recorded in England that I can trace occurred in the Queen's Hospital for Children, Hackney Road, and was reported by C. B. Lanyon. Sylvest tells me that the disease seems to have disappeared from Denmark, but I have some reason to believe that it was widespread in England during 1936, and it is possible that these remarks will enable others to diagnose certain disturbing cases in retrospect. In May of that year W. J. Rutherfurd reported what seems certain to have been an outbreak of epidemic myalgia in adults in Manchester, and I had a private communication from a doctor in Knaresborough, in the West Riding, of several typical cases. In October the following appeared in the *British Medical Journal*:—

"Dr. L. B. Scott (Dorset) writes: During the last two months my partners and I have seen some forty or fifty cases of an epidemic febrile disease whose main symptom is pain on movement of the diaphragm, that is, on laughing, coughing, sneezing, yawning, or deep breathing. This pain is in the lower thoracic region. Children and young adults are affected. The temperature is high at first and

lasts irregularly for a week or less, sometimes with intermissions. Anorexia is marked. Sometimes there is a slight sore throat. The tongue remains clean. There is considerable prostration in the severe cases, but all have recovered well."

It seems clear that this epidemic was of the same nature. As I read it I remarked that it was most unlikely that I should ever again see victims of this disorder in this remote area, but on the very afternoon of the day on which the *Journal* reached me I was to learn my mistake. On Saturday, Oct. 3, at 3 p.m., I received an urgent message from a hamlet three miles away to see a baby, aged 11 months, who at first sight appeared to be suffering from intussusception. She seemed to be in great pain, and drawing up her knees, but I found she had not vomited, her temperature was 98·8° F., pulse 150, and respirations 40 to the minute. Later she was in a dazed condition, the temperature had risen to 100·8°, her respirations were shallow and grunting, and 36 to the minute, and she had the appearance of a commencing pneumonia. The diagnosis was made easy when I elicited the following history :—

The family had been for its annual holiday to a seaside resort on the west coast, returning on Sunday, Sept. 27. All members were quite well until Tuesday, the 29th, when the mother, on getting up, found she could hardly breathe and had a sharp pain in her right chest. On the same day her eldest child, a boy of 10, had epigastric pain, worse on taking a deep breath and on laughing. Both these illnesses recurred on the Thursday and the mother's also on the Saturday. Just before my second visit at 6 p.m. the remaining child, a girl of 6, began with pain under the right costal margin, and I found her sobbing, which was patently a very uncomfortable procedure.

Both she and the baby had the typical recurrent form of the disease, and both showed the fixity of the diaphragm, with the absence of abdominal movement on respiration. Finally, the father of the children fell a victim on Monday, Oct. 5, and the maid on the 7th, although she admitted to severe pains also on the 5th. Sweating and loss of appetite were marked features in all the patients.

This was not the end of my experience in 1936, as a fortnight later I was asked to see some instances of a mysterious infectious disease in a doctor's family in a neighbouring market town. The first was in a little boy aged 3 years, whose main symptom was acute abdominal pain and who had such an 'acute abdomen' appearance that his father and his father's partner thought it advisable to call in a surgeon. The surgeon was not convinced, paid a prolonged visit, and before he left the little boy himself announced that he had no pain and seemed to be normal in every respect. The doctor himself succumbed next, his pain being under the right costal margin and as he graphically described it, his 'liver felt like lead'. The same day a maid collapsed and was ill enough to have to retire to bed. The next patient was the baby girl, aged 9 months, whose respirations were 60 to the minute. Her father was convinced that she was suffering from pneumonia, which, however, cleared up with surprising rapidity. Finally, the charwoman contracted the disease, passed it on to her sister, who in turn infected her husband and their two children.

Three epidemics have been recently described among children. Rector, in 1935, gives an account of 19 cases in children under 8, whom he had under observation in the children's and infants' hospital at Boston. In his experience the pain was generally abdominal. Of the 19 patients, only 3 had pain confined to the chest, 5 had both abdominal and

thoracic pain, and in the remaining 11 it was confined to the abdomen. As in my patients, profuse sweats were always present in Rector's series, and he also lays stress on the recurrent nature of the disease, as it returned in 75 per cent of these children.

G. Lindberg, writing in *Acta pædiatrica* (September, 1936), described an epidemic among children which lasted from the middle of August until the middle of October, and which is of considerable importance, as it consisted of 80 cases. He records pain in the chest and abdomen, and less frequently in the neck, head and arms. Many cases in this epidemic were diagnosed as appendicitis, which is not surprising, but he raises a new point in describing, apparently for the first time, instances of meningitis, five in number, and of a benign nature, as all recovered. He considers the incubation period to be two to four days.

H. Vuillet describes what is probably the first epidemic to be reported in France among the children of an orphanage in Paris during August and September, 1933, and states that the symptoms exactly corresponded with the descriptions of the disease in Scandinavian and English literature. Three patients in this epidemic suffered from orchitis.

The importance of the condition is now being recognized by the writers of text-books. Harry Beckman, in his *Treatment in General Practice*, describes the condition under the name of 'epidemic pleurodynia' ('devil's grip'). Sir Humphry Rolleston gives it attention in his *Encyclopædia of Medical Practice*, and in the latest edition of Osler there is a short account.

Epidemiology.—The disease appears to be spread by direct contact, and the incubation period to be short, Sylvest mentioning two to four days. In our single instance of the short and

only possible exposure it was four days, and this is in agreement with the description of an epidemic in a Swedish warship, as the first cases did not appear until four days after leaving port (Huss). The period of infectivity is probably brief, but remains up to the end of the illness. The adult victim in our first outbreak fell ill four days after symptoms had disappeared in the last sufferer of his family. There have been too few observations in any of the recorded epidemics to attempt to dogmatize on these points.

No evidence has been brought forward to prove spread of infection by means of food or water or, as was tentatively suggested by Huss, through the agency of insect vectors.

It appears to be a disease of seasonal incidence, as nearly all the epidemics occurred in the late summer or autumn. Sylvest mentions it as the commonest form of illness in these seasons in the years when it was epidemic in Denmark.

One attack does not appear necessarily to confer immunity, as the disease has been observed twice in the same patient by Sylvest and others. The only personal observation I can make on this is that, in the outbreak in the doctor's family recorded above, the doctor's wife was the only member to escape, and she gave a vivid description of an illness which she had had some years before, and which she was convinced was the same as that from which her family was suffering. Her doctor diagnosed the malady in her case as pleurodynia.

Diagnosis.—My story would not be complete without some points on diagnosis, the importance of which it is impossible to overstress, as a correct diagnosis enables one from the nature of the disease to allay all anxiety and give an unqualifiedly good outlook. In children the diagnosis has to be made from acute pneumonia and from acute abdominal conditions, of which acute appendicitis and intussusception would be the

most likely, and in adults from pleurisy and pneumonia, acute appendicitis, renal colic, gall-stone colic, and, as we have seen, from perforated duodenal ulcer.

Three points in which the disease is obligingly definite have helped me considerably in children, and must also be of assistance in the differential diagnosis of the complaint in adults—of the latter I cannot speak personally as my own adult patients were not sufficiently ill to cause much difficulty.

These points are: (1) The almost invariable absence of vomiting; this is the most important, as, in addition to its presence in abdominal conditions, it is so very common at the beginning of many children's illnesses, and in many of the infectious diseases. (2) The greatly increased respiratory rate, whether the pain is abdominal or thoracic. (3) The rarity and lack of prominence of cough.

Treatment.—Treatment does not seem to have any effect, but hot applications are much appreciated, and when the diagnosis is safely made an appropriate dose of nepenthe can be given.

All those who have had experience of epidemic myalgia realize the danger of a diagnosis of serious surgical conditions, and some of the normal appendixes that are yearly removed may have been from patients suffering from this disease.

At a meeting where this subject was discussed, one speaker humorously remarked that as there was no treatment it was a disease which could be safely left to the care of the physician; but I think he should have added that the only possible danger in the disease was that, unless the syndrome is thoroughly understood, it will inevitably come in some instances under the care of the surgeon.

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Mr. Philip Wright.

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