It has been suggested to me that, before commencing our subject proper this evening, it might be advisable to touch on a few points in the bionomics of fleas which affect their carriage of plague and its transference to man. No doubt these matters are familiar to most of our members, but I hope they may be of interest to some. First of all, I would venture to remind you that of the four stages in the development of fleas, the first three are free and independent, and are passed usually in the nest or other habitation of the host, and only in the adult stage is the flea parasitic, or rather, predatory. Consequently, the animals which tend to harbour fleas are those which provide themselves with some nest or den, to which they return; and as the developing fleas reach maturity here, they, in their turn, attack the host. Whereas animals like monkeys and deer, under natural conditions, have no permanent home, and so are normally free from fleas. It is an interesting point that stray dogs of the real homeless variety do not harbour fleas, though they are usually found to be swarming with lice—a practical illustration of the totally different breeding habits of these two insects.

1 This account of plague in Britain was an informal address, delivered entirely without notes, even to the quotations cited, and taken down by a reporter in attendance. It was merely intended to interest those who have never had occasion to inquire into these matters for themselves, and makes no pretence to be a serious historical contribution. In consequence, no references are given, nor any acknowledgment made of borrowed material; but, with one exception, all the chronicles named or quoted, as well as most of the other texts mentioned, have been read in the original. Owing to the popular nature of the discourse, the speaker was most unwilling to agree to publication, but it was felt that so striking and informative an address, as vivid to read as to hear, should not be denied to absent Fellows. Colonel MacArthur's too modest reluctance has happily been overcome, to the great advantage of the Society's Transactions. [Reprinted by courtesy of the Royal Society of Tropical Medicine and Hygiene, and by request of our readers.—Ed.]
Then again, the larvæ of certain fleas, for example, *Ceratophyllus fasciatus*, require for their development blood, and this they obtain from the faeces of the parent flea. In the case of fleas, and many blood-sucking insects, the process of feeding is closely associated with that of evacuation, and finally, the flea voids from the rectum practically pure blood. It may sometimes happen that we have occasion to wonder if a disturbed night’s sleep might possibly have been due to the depredations of one of these ectoparasites picked up somewhere or other. And, short of actually seeing the intruder itself, the best evidence of its presence is to see on the bedding or clothing these minute specks of blood. This necessity for providing the larva with food modifies the habits of such fleas in a very material respect, and instead of accompanying their host on its expeditions into the outer world, they tend to remain behind in the nest, so as to provide for the wants of their offspring. But in the case of fleas like *Xenopsylla cheopis* the larva do not require blood, and so the adult has no object in deserting the host. This renders such fleas much more dangerous. Take the case of rats infested with *X. cheopis* and making an occasional raid into a grain store. The fleas carried by the rats may lay large numbers of eggs, and the resulting larvæ can feed happily on the grain and other débris, and reach maturity there; and so the whole grain store may become a nursery for fleas. This could not happen under similar conditions in the case of fleas where the larvæ are restricted by the necessity for blood. The difference of habit is important in quite another connexion. A flea census carried out on rats infested with *X. cheopis* and *C. fasciatus* would give misleading figures regarding the respective numbers of these species infesting the rats, because a large proportion of the *cheopis* would be found on the trapped rats, whereas most of the *fasciatus* would have remained in the nest.

Another important characteristic of fleas is that they are not absolutely restricted in their choice of a host. In this respect they differ entirely from lice, and if plague were carried by lice the disease would never spread to man at all. Although a flea usually prefers its own particular host, yet, in the absence of this, it may live happily on animals of quite another kind. For example, I have examined rats and have found them infested only with the fleas of mice. A large batch of fleas sent recently from India, and taken from tame rabbits there, consisted, without exception, of rat fleas; and when staying with friends some time ago, I discovered in some stables, at the back of the house, a puppy, apparently belonging to nobody, and literally swarming with fleas. This seemed a golden opportunity, for I was rather short of dog fleas for the purposes of my class, and so I enticed the puppy into the house and up to my room, so that I could fleas him without disturbance. To my delight I secured a good handful of fleas, and I have reason to remember that seeing no other preservative available, I put them into my wife’s bottle of scent. To my great disappointment, on examining them afterwards, with two exceptions they were *Pulex irritans,*
the flea of man; and it is an interesting point that these fleas were most reluctant to leave the dog, and not one made any effort to transfer its attentions to myself.

The fleas most commonly found on rats are contained in seven genera, and each of these includes species proven to carry plague. But these do not all bite man with equal avidity; Leptopsylla musculi bites man reluctantly, and Ctenophthalmus celiticus, another good plague carrier, will not bite him at all. All species of these genera are not equally hospitable to Bacillus pestis, and of the large genus Xenopsylla—numbering some forty species if we include Synosternus—only one species, cheopis, is known to carry plague under natural conditions. And the replacement of cheopis by astia has been advanced as a reason for the freedom of certain parts of India from plague. Xenopsylla is poorly represented in India, where only three species occur, and it is interesting that astia appears to be indigenous there, and yet excluded from the dozens of species in Africa, that great home of Xenopsylla. X. astia has been reported from many parts of Africa, but, as a matter of fact, it occurs only as a restricted immigrant on parts of the East Coast, and the other African records of astia probably refer to X. nubicus.

The method of carriage of plague by fleas is familiar to all—the obstruction of the proventriculus by a plug of bacilli, and the consequent regurgitation of infected blood by the starving flea in its frantic efforts to feed. That plague is primarily a disease of animals, and that every outbreak of human plague is merely an extension of preceding or concurrent plague amongst animals, are matters of common knowledge. But it is not always remembered that plague is also a true disease of fleas.

The fate of an obstructed flea depends mainly on the atmospheric conditions; in a dry, tropical heat fleas shrivel up and perish quickly, but where the air is cooler, and more moist, obstructed fleas may remain alive and capable of conveying infection for several weeks. In one experiment of the late Mr. BacoR's, a Ceratophyllus fasciatus was infected with plague and starved for some six weeks. At the end of this time it was allowed to bite a mouse which forthwith developed plague.

The optimum temperature for plague is about 70° F., and so in tropical countries, where really high temperatures obtain, plague is a disease of the less hot season of the year; but in temperate countries plague is a disease of the summer months, and as winter comes on, with the lessened activity of the fleas, and the lower degree of septicæmia in the rats, plague dies down. It was popular knowledge in England in the old days, that an unusually hot summer was necessary for severe prevalence of plague; but such practical wisdom is found mixed up with abstractions about the appearance of comets, eclipses of the sun, and other high matters of that kind.

In bubonic plague there is usually no evidence of spread of the disease from one person to another, and the most rational explanation seems to be
that the blood of the human subject does not contain the enormous numbers of bacilli usually found in animals, and so fleas which are present have not the same chance of becoming infected. In blood cultures made from fatal cases of bubonic plague, I have found bacilli so sparse that theoretically one could have fed 20,000 fleas on such a case, and yet have infected none. To infect fleas with any certainty from a plague case, one would expect to see bacilli in direct smears of the blood; this would be very rare in bubonic plague, and even in septicæmic plague I do not think that many would recommend direct examination of the blood as a means of routine diagnosis.

I know of no evidence of spread of the disease from person to person in this country in old times. If such infection occurred commonly, it would be difficult to explain why the “Black Death” took a year and a half to spread from the south of England to the middle of Scotland, with armies marching and counter marching, bands of beggars and other masterless men, monks, pilgrims and so on, wandering to and fro. So, too, the London Plague of 1665 took about three months to spread to a serious extent from the present Kingsway into the City. As is well known, pneumonic plague is acutely infectious from one person to another, but it is difficult to determine to what extent this form may have occurred in Europe. It is possible that John of Burgundy refers to pneumonic plague when he says, “From the buboes some recover; from the spitting of blood, none”; it is more probable that he is only referring to the haemorrhagic form of septicæmic plague. John of Burgundy prefaces his treatise thus: “I, John of Burgundy, citizen of Liège, and professor in the art of medicine, yet, nevertheless, the least of all physicians”—a spirit, I fear, which would not take John of Burgundy very far in consulting practice to-day!

In those old times the prognostic significance of the various plague signs was well known—the fatal import of the haemorrhages into the skin, called “God’s tokens,” or shortly, “the tokens,” because regarded as betokening impending death. In Anthony and Cleopatra Shakespeare talks of “The tokened pestilence where death is sure.” Also the good prognostic sign of suppuration of the buboes was common knowledge. Says Defoe, “This was counted the most promising particular in the whole infection, for if these swellings could be brought to a head and to break and run, or, as the surgeons call it, digest, the patient generally recovered.” The Dyall of Agues records the interesting case of a London woman, the wife of a “certayne Baker” living “without Tempel barre,” who, in the epidemid of 1563, had plague on three different occasions, “at Midsommer, and at Bartholomewtide, and at Michaelmas.” Of the respective buboes the writer says: “The first time it brake, the second time it brake, but ran little, the third time it appeared and brake not,” and she died.

Now I come to some discussion of the history of plague in this country. The earliest invasion of Europe by bubonic plague, of which there is any authentic account, was the Great Plague of Justinian, a devastating
epidemic which swept over Europe in the year 543. Although England must have suffered from this visitation in common with the rest of the Continent, there is no record of the Great Plague of Justinian in this country. We know from the Irish chroniclers that a calamitous epidemic of bubonic plague raged there which, in the words of the Four Masters, carried off "the noblest third of the human race." With plague raging on the one hand on the Continent, and in Ireland on the other, we can be certain that England suffered from a similar catastrophe. The Great Plague of Justinian was called on the Continent the Lues Inguinaria—the Groin Disease—from the usual site of the buboes, and it is worth recalling that our ordinary word "bubo" is merely Greek for the groin.

A hundred years afterwards, in the year 664, another great pestilence devastated these islands, the nature of which is not set out in any English record. The Venerable Bede describes the epidemic in his Ecclesiastical History, though in terms too general to allow of identification. And neither in the Latin nor in the Anglo-Saxon version of his history is any definitive term applied to the pestilence. But turning again to the Irish records, we learn that this also was bubonic plague, from which two-thirds of the inhabitants of Ireland are said to have perished.

And from this point, down through the Anglo-Saxon, Danish, and Norman times, we hear only faint echoes of plague and pestilence; of dire mortality; of monasteries stripped of their inhabitants by sudden death. A few lines in some monkish chronicle recording that "This year there was a great pestilence amongst the people"; that, "This year there was an unprecedented mortality"; and that, "This year there was a great plague in London." And so on, plague, pestilence and famine; famine, pestilence and plague; till with these, and other miseries, the writer of An Anglo-Saxon Chronicle cries out in despair: "Wæs neuer gate mare wreccehed on lande . . . 7 hi seadan openlich Æ. Christ slep 7 his haelchen"—"Never was land more stricken . . . and they said openly, that Christ and His Saints were asleep."

Most of these old epidemics were ascribed to hunger, so that the Anglorum fames became proverbial—"The affliction of the Normans, the fire of the French, the hunger of the English."

It is likely that some of these old nameless and unrecognizable pestilences were bubonic plague, especially those recorded as causing a sudden high mortality, and accompanied by much panic. But it is unprofitable to theorize about these old unhappy far-off things, and we reach much safer ground with that great universal epidemic of bubonic plague in the fourteenth century, since called "The Black Death." How it came by this name I do not know. The usual explanation that it was so called from the frequency of vomiting of black blood, is not very convincing. The people who passed through the epidemic and saw their friends swept off by the score, did not employ this name, judging from their chronicles; and indeed, I know of no use of the term "The Black Death" within 200
years of the epidemic itself, by which time any symptoms peculiar to that outbreak would have passed beyond popular memory. The old English name for the plague was "The Botch," which means a tumour, a bubo, an excrescence. The term "boss" in the boss of a shield, embossed metal work, etc., is ultimately the same word. "Botch" survives to-day in the dialects of Normandy and Picardy in the form "bosch," a term of abuse, and its application to the Germans during the late war familiarized it to all. It is of interest that the same word in almost identical form, namely, "boss," was a favourite contemptuous epithet with that great master of vituperation, John Knox. In one of his writings, referring to a certain "Bishop"—and John Knox was not very fond of "bischope"—he says that no one attended to listen to the bishop's sermon except his own jack-men, and "some old bosse of the toune."

To return from this digression—the Black Death spread westwards from Asia, and entered Europe by the Mediterranean ports in the year 1347. It spread northwards, and first broke out in England at Weymouth, in August, 1348. It spread over the southern counties, turning every village into a charnel house, and reached Bristol. The inhabitants of Gloucester made a desperate attempt to isolate their town from Bristol, but without result; they might control the movements of the inhabitants, but the rats were beyond their jurisdiction. The plague spread to Gloucester then to Oxford, and thence to London, where it appeared at Michaelmas of that same year. It raged furiously in the capital, dying down somewhat with the onset of winter. The next year it flared up again and raged all over England, leaving not a village, not a hamlet, scarcely a house untouched. Scotland escaped in the main that year, but not altogether. When the Scots learned of the stricken and prostrate state of their old foe, they thought the time opportune for a massed assault, and assembled an army in Selkirk Forest preparatory to a march into England. But the plague, spreading slowly northwards, smote the Scottish army, of whom some 5,000 perished, a disaster which effectively cooled their warlike ardour, and so impressed them that years afterwards Scottish armies invading England said a special prayer beseeching protection from the plague: "God and Sen Mungo, Sen Ninian and Seynt Andrew scheld us this day and ilka day fro Goddis grace, and the foule deth that Ynglessh men dyene upon." The next year, 1350, the Black Death fell on Scotland with its fullest fury. So the range of the epidemic in Britain extended over three years—the summer of 1348 in London and the south; 1349, all over England; and 1350 in Scotland.

For the best contemporary description of the Black Death we must go to Ireland. A Franciscan monk, John Clyn, of Kilkenny, kept a Latin chronicle, which he called The Annals of Ireland, and here, within a short space we have the most vivid account of the Black Death extant. Unlike most Latin chronicles, it is not a mere dry recital of facts, but is a moving and most pathetic document, compiled by one who wrote, as he says, "Inter mortuos mortem expectans." "And I, Friar John Clyn, of
the Order of the Friars Minor, and of the Convent of Kilkenny, wrote in this book those notable things which happened in my time. And I . . . amongst the dead, waiting for death until it come, have reduced these things to writing . . . and, lest the writing should perish with the writer, and the work fail together with the workman, I leave parchment for continuing the work, if haply any man survive, and any of the race of Adam escape this pestilence, and continue the work which I have commenced." He describes briefly, but clearly, the main symptoms of the disease. And many died, he says, from carbuncles and buboes and swellings, which grew on their legs and under their arms; others from a seizure in the head as if turning to a frenzy; others from the vomiting of blood. So great were the fear and dread, that men hardly dared to minister to the sick, or to bury the dead; "scarcely one alone ever died in a house, but commonly husband, wife, children and servants all went the one way, the way of death, and both the penitent and the confessor were carried to the same grave." When poor Friar John Clyn said he wrote as one inter mortuos mortem expectans, his foreboding was well founded. His chronicle breaks off abruptly and there is added by another hand: "It is seen that here the author died."

There are no figures which give the total mortality from the Black Death in this country, but the usual computation is that from half to two-thirds of the people perished. Prior to the Black Death the population of Norwich is calculated as 24,000, and after the pestilence it is known that only 7,000 of these were left alive. Records of the Manor Courts exist which show the appalling mortality throughout the country; and a striking feature is that so many of the tenants died leaving neither heirs, nor any blood relation, to inherit their property, the whole family having been wiped out. Law suits came to an end, because no one was left to carry them on. In one case which was proceeding before the courts, out of sixteen people concerned, eleven died of plague. Three Archbishops of Canterbury died within the year. The cause of the death of the first I have not been able to ascertain; the second, John Uffurd, died of plague before he was consecrated; his successor, the learned Thomas Bradwardine, arrived at Lambeth Palace, and within a week was dead of plague, with buboes in each axilla. But even in this dreadful time hope continued to triumph over experience, for we read of one good lady who buried three husbands dead of plague within three months.

Since all the chroniclers were themselves monks, most of our exact data are concerned with matters ecclesiastical. It was officially reported to the Pope that in the diocese of York and of Norfolk, two out of every three of the clergy had perished. In East Anglia alone, 800 parishes were left vacant through the death of the incumbent, eighty of these were left vacant twice, ten of them were left vacant three times, and actually several were left vacant four times. In the Abbey of Holderness, in Yorkshire, out of fifty monks, forty died; and most of the tenants on the abbey lands
met with the same fate. In Croxton monastery, Lincolnshire, all the monks died except the abbot and the prior. And at Sandon, in Surrey, not a single one of the brethren remained alive. In the words of Gilbert le Baker, a contemporary monk: "Of the common people there died a number beyond calculation; and of the clergy and ecclesiastics a multitude known to God only."

The Black Death was the greatest calamity that has befallen the human race within historical times. It broke up the Feudal System on which the whole political and economic life was based, and altered the history of Europe. The changes wrought by the recent Great War are as nothing compared with the chaos and confusion which resulted from the Black Death. It lies like a great gulf, breaching the continuity of history and tradition.

For over 300 years plague smouldered on in England, every now and then flaming up into a great epidemic. Thus, during the remainder of the 14th Century, after the Black Death, there were four such major epidemics known to the chroniclers as the Pestis Secunda, the Pestis Tertia, and so on; and this state of affairs continued throughout the 15th Century. During this century, on no less than thirty occasions were one or more of the Oxford colleges either closed, or removed elsewhere, through outbreaks of plague. In May, 1449, Parliament adjourned from Westminster to Winchester because of the plague; six months later Parliament adjourned to Ludgate because of the plague; three months later to Leicester, because of the plague; then to Reading because of the plague; and finally, plague breaking out in Reading, Parliament closed down—which I am quite sure did no one any harm.

Some deaths in one of these numerous outbreaks had a connexion with one of the finest love poems in the English language. I refer to The Kingis Quair by James I of Scotland. This monarch, when a boy on his way to France, was taken prisoner by an English ship off Flamborough Head. He was brought to England where he remained in captivity for eighteen years, the greater part of his imprisonment being passed in the Tower. The English politicians of the time were at the age-long game of trying to arrange a marriage alliance with the Scottish crown so as to counteract the French influence in Scotland. A hundred years before, they had married Princess Joan of the Tower to the son of Robert the Bruce. The next century they married Margaret Tudor, daughter of Henry VII, to James IV, from which union came the Stuart succession to the English throne. And now they were determined to marry some one to James I. So with this object, a beautiful girl of royal blood, Lady Joan Beaufort, was sent to walk in the Tower gardens, she, of course, being innocent of any share in the plot. In The Kingis Quair James describes how he was looking out of his prison window, watching the birds in the trees and wondering "That I am thrall, and birdis gone at large," when, looking down, he saw the Lady Joan go past.
"And there-with kest I doun myn eye ayeynce,
Quhare as I sawe, walking vnder the toure,
Pull secretely new cummyn hir to pleyne,
The fairest or the freschest yonge floure
That euer I saw, me thoght, before that houre,
For quhich sodain abate, anon astert
The blude of all my body to my hert.
And though I stude abaissit tho a lyte,
No wonder was; for-quhy my wittis all
Were so ouercom with plesance and delyte,
Onely throu latting of myn eyen fall,
That sudaynly my hert became hir thrall,
For euer, of free wyll; for of manace
There was no takyn In hir suec face."

—and so on, in the most delightful manner imaginable.

The acquaintanship thus romantically begun ripened into affection, and finally James Stewart and the Lady Joan were married, in the Church of St. Mary Overy, on 13th February, 1424. Shortly afterwards, King James was set free on promise of payment of a ransom, and he and the Lady Joan returned to Scotland where they were crowned King and Queen of Scots. Now we come to the matter of the plague. As surety for the payment of the ransom, a number of Scottish nobles were sent hostages to London, and while there they fell victims to the plague. James I of Scotland was highly incensed, and to prevent a serious rupture, an English ambassador was sent post haste to Edinburgh to explain that these nobles had not been confined in London, but were free to wander about wherever they pleased, and if, unfortunately, they had fallen victims to the plague, the English Government could not be held responsible. But James had the last word in the quarrel, for he never completed the payment of his ransom!

As regards plague, the history of the 16th Century was that of the 15th Century over again. A foreign ambassador of the period, writing to his government, says that practically every year there are deaths from plague in London, but that ordinarily the people do not concern themselves much about them. But, as we know, every now and then a great epidemic occurred, which startled the people out of their complacency. Thus, during the first half of the century there were epidemics of the first degree in 1500, 1509, 1513, 1531, 1543, and 1547, and some of these are sufficiently interesting to deserve a word in passing. In the plague of 1531 we first hear of the "Bills of Mortality," when the Lords of the Council commanded the Mayor of London to report weekly the number of those who had died of the Plague. Readers of Defoe, Pepys, and similar authors, are familiar with these Bills.

During the epidemic of 1543 was issued the first Plague Order still known in extenso. This directs that infected houses are to have a blue cross, and the legend, "Lord, have mercy upon us!" affixed to the door; and that such houses are to be shut up with the inhabitants inside, hale
and sick together, for one month. If for some special reason permission
is given for an inhabitant to leave the house, he is to carry in his hand
a white wand two feet long, so that he may be known as a plague contact
and avoided. Except watch-dogs, all dogs are to be destroyed. There
was a strong feeling that both cats and dogs were instrumental in spreading
plague, and with good reason. I have attended a case of fatal plague in
an European girl infected by a pet kitten; and although dogs are more
resistant than cats, still they can easily carry infected fleas in their
coats. But people made the great mistake of supposing that man himself
was the chief source of infection. The sanitary conditions of the time
were ideal for the prevalence and spread of plague. Erasmus, who visited
England during this period, describes the houses as he saw them. The
floors made of loam, covered with rushes, on which were thrown bones,
spillings of beer, vomit and excrement. And this garbage was not removed,
but was covered with more rushes, and so on the floors there might be the
accumulated filth of twenty years. The houses were over-crowded and
ill-ventilated, the streets were blocked with garbage. People were for­
bidden to throw excrement out of the windows, and were directed to carry
down such filth and place it in the streets. Rats swarmed everywhere,
and it is important to remember that the common rat was then Rattus rattus,
which breeds in houses and lives in close contact with man. Fleas
swarmed in the houses, and were accepted as a matter of course. Gas­
goine, an Elizabethan poet, in a poem where he moralizes and compares
sleep with death, regards hordes of fleas in his bed as naturally as he does
the presence of the bedding. In this doleful and depressing composition
he goes on:—

"My bed itself is like the grave, my sheets the winding-sheet,
The clothes the earth that I must have to cover me most meet.
The hungry fleas that frisk so fresh to worms I can compare,
That greedily will gnaw my flesh and leave the bones full bare."

And even 100 years later, Samuel Pepys records that having to spend a
night in an overcrowded inn, he shared a bed with one, Master Clark,
who, he says, did "attract all the fleas to himself, to my exceeding relief." It
was not the presence of the fleas which was noteworthy, but merely
that they found Master Clark the more attractive, and Samuel Pepys was
left in peace. Another poet, John Donne, when paying court to a lady,
noticed a flea hopping from her to him. He was so moved by the bond
of union thus constituted that he wrote a very pretty sonnet about it,
ending up with this engaging thought: "And in this flea our two bloods
mingled bee."

With the houses constituting a paradise for rats and fleas swarming
and tolerated as these quotations show, is it any wonder that plague
flourished?

About this period we find a most interesting publication, entitled,
Ane Breve Description of the Pest by Gilbert Skene, professor of medicine
in Aberdeen, and physician to James VI of Scotland. So far as I know, this is the first book published in this country by any physician dealing with plague and based on his own personal knowledge and observations, earlier writers having been content to translate from continental authors, or to plagiarise from the ancients. It is an excellent production. He says: "the cause of pest in ane Citie is stinkand corruptiouin and filth quhilk occupeis the commune streittis and gaittis." He noted that many animals die of plague, and considered it a bad sign when the "Moudewarp and Serpent leavis the Eird [earth] beand molestit be the vapore contenit within the bowells of the samin." By "moudearp" he means moles—a fine old word found in every Teutonic language, and surviving in classical English beyond the time of Spenser and Shakespeare, both of whom use it. I understand the word lingers on in Scotland, where no doubt the schoolmasters, after the manner of their kind, will soon lay it by the heels. It is more difficult to determine what Gilbert Skene meant by "Serpent," for a writer on zoology of his time includes under the elastic heading of "Serpents" such diverse creatures as Crocodiles, Toads, Spiders and Bees. The late Mr. BACOT, in one of his papers, pointed out that certain fleas of hens can carry plague, and suggested that the occurrence of the disease amongst these birds would be fraught with much danger to man. But Gilbert Skeene was some 400 years ahead of Mr. BACOT. He says this "infectioun bringis baith man and beast to death, the soner gif [if] sic incressis of lang tyme, and speciallie quhan the Domesticall foulis becummis pestilentiale it is ane signe of maist dangerous pest to follow, because quhan the beist is infectit mekil mair salt the man."

During the Plague of 1563, the recorded deaths in London—always much less than the true deaths—rose to 2,000 in the week, and Stratford-on-Avon, where a small infant, William Shakespeare by name, was then living, lost one-seventh of its inhabitants from plague. The Shakespeare family escaped the plague on this occasion, and we find the poet's father, John Shakespeare, then an Alderman and a person of substance, subscribing liberally towards the relief of those left destitute by the plague. The earliest mention of John Shakespeare's name in the records of Stratford-on-Avon occurs a few years earlier, when he was haled before the magistrates and fined the sum of twelve pence for having at his door an accumulation of filth which offended even the seasoned nostrils of his neighbours. It is possible that John Shakespeare profited from this salutary lesson, and in consequence the Shakespearean rats may have departed for other premises—as rats do—where the owner's natural inclination to harbour filth had not been hampered by the operations of the law! Shakespeare was very familiar with plague, and makes many references to the disease in his plays. Twice he refers to the skin hæmorrhages—then called the tokens—as

Several members of the audience informed the speaker, after the meeting, that "Moudearp" is still used in English dialect.
Old-time Plague in Britain

presaging death—"The tokened pestilence where death is sure"; and, "the death tokens . . . cry 'No recovery.'" Again, in a figurative allusion to the Plague Orders, he says, "Write 'Lord have mercy on us,' on these three . . . they are infected; they have the plague." Shakespeare had good reason to be familiar with plague, for he suffered many things because of it. An Order of the Privy Council directed that the London theatres were to be closed in any week that the plague deaths reached thirty, and on many occasions Shakespeare was driven from London by the operations of this Order. There is a hit at this most unpopular Order in Middleton's *Five Gallants*, where one of the characters says, "'Tis e'en as uncertain as playing, now up and now down, for if the bill do rise to above thirty, here's no place for players." During the Great Plague of 1603, the London theatres were closed for a prolonged period, and we find Richard Burbage's company—that is, Shakespeare's—producing six plays at Hampton Court Palace where James I was in residence, having been driven from London by the plague. And a few months later, James I—always a patron of the drama—subscribed thirty pounds—about £300 to-day—towards the relief of distress in Burbage's company through the prolonged closing down of the London theatres.

In the epidemic of 1603, we meet with a delightful example of the strange workings of the official mind. Presumably there had been complaints of the Government's failure to check the spread of the pestilence, and so the Plague Order for that year directs that the cross affixed to the doors and the legend "Lord have mercy upon us," previously blue were to be changed to red, and the wands carried by the contacts, previously white, were to be altered to red also. No doubt the official responsible for this happy inspiration congratulated himself on his resource, but we do not find that the red crosses checked the plague any more effectively than the superseded blue crosses had done.

For several years after the great epidemic of 1603, plague in London remained at a high endemic level, and all the theatres were closed from July to December in each of the five years, 1606 to 1610. During this period of enforced rest Shakespeare seems to have retired to Stratford-on-Avon, and the production of his play *Macbeth*, written to celebrate the accession of James Stuart to the throne, was postponed for some seven years. It is interesting to observe that Shakespeare was enough of the courtier to alter the story of Macbeth. As he found it in Holinshed's *Chronicles*, Banquo was as much concerned in the murder of King Duncan as Macbeth was, whereas in the play, Banquo is a noble-minded and high-souled man who falls a victim to the blood-thirsty Macbeth. Presumably Shakespeare canonized Banquo because he was the ancestor of the Royal Stuarts, and it would hardly have been politic, in a play celebrating their succession to the crown, to have held up their ancestor to obloquy as a murderer.

Between 1611 and 1624, we hear very little of plague, except for a few
minor outbreaks in the provinces. But in 1625 there occurred an epidemic of the first magnitude during which the recorded plague deaths in London rose to 4,000 a week, and for the next forty years this outbreak was known as “The Great Plague of London,” until that of 1665 effaced it from the popular memory. I do not propose to talk about the plague of 1625, because everything of interest this year was repeated in the epidemic of 1665. In the interval between these two outbreaks, plague was present constantly in London, and deaths from the disease are recorded for practically every one of the intervening forty years.

This brings us to the Plague of London of 1665. This is often known as “The Great Plague of London,” though it was no greater in proportion than a dozen other outbreaks. It is often foolishly called “The Plague of London”—as if there had never been any plague in London except the one. It is certainly the best known, partly because it was the last, and also partly from the popularity of Defoe’s *Journal of the Plague Year*, although it is worth remembering that Defoe witnessed the epidemic only as a small child four years old.

In 1665, the City was still the chief residential district of London, and though many of the open spaces had been built over, there was not the same squalor, overcrowding, and filth existing in the City as was found in the Liberties and out-parishes beyond the walls. These were slum areas covered with hovels and tenements, and traversed by mazes of winding lanes and alley. In the Liberties and out-parishes, the epidemics of 1603 and 1625 first broke out and raged most fiercely, and this history was repeated in the Great Plague of 1665. Contemporary writers spent much energy in an attempt to trace the source of this last of the London plagues, some seeing it in bales of goods from Holland, others in ships from Turkey—a futile inquiry when we know that plague had been present in London constantly for the past forty years. According to reports of the time, many deaths from plague were occurring at the end of 1664-5, in the Parish of St. Giles’ in the Fields—through which the modern Kingsway runs—but these plague deaths are not found recorded in the Bills of Mortality. Over this period, however, the total London deaths recorded exceed the normal, the increase probably being plague deaths, concealed in Defoe’s words, “by knavery and collusion.” By the end of May the deaths in St. Giles’ were too numerous to permit of further concealments, and this district continued to bear the main brunt of the outbreak until the middle of June. All this time the plague was spreading slowly eastwards, along Holborn and the Strand, and through Westminster, but the City proper was still but little affected by mid July. By the end of August, plague had died down in the western parishes, and was raging at its fullest fury in the City. There was the usual stampede of all who could fly. The Court left London in June, finally arriving at Oxford, and for weeks all the roads leading from London were crowded with pedestrians and horsemen, flying from the wrath to come. Many of the clergy deserted their charges and sought safety in
flight, so that the Cromwellian ministers who had been deposed at the Restoration came out and preached openly in the City churches; an enormity which so hurt the tender conscience of the Merry Monarch, that he sent a letter upbraiding the authorities for their laxness in permitting such an outrage—a letter which would read much better if it had been addressed from Our Palace of Whitehall, and not from Oxford.

These fugitives spread terror and consternation wherever they went, and those lacking some shelter or habitation of their own found every village, every house, barred against them. Armed men patrolled the roads and tried to drive the fugitives back to London, so that numbers perished along the highways and hedges; and so strong was the feeling against them that some of these poor wretches were even denied Christian burial.

Some of the Court party remained in the stricken City, cheering and enheartening others by their courageous bearing. Amongst these, as one would expect, was stout-hearted George Monck, Duke of Albemarle, who had set Charles Stuart on the throne, and who assumed control of the Liberties and out-parishes which lay beyond the authority of the City of London.

The Lord Mayor, Sir John Lawrence, and the Aldermen, remained gallantly at their posts, and saw to the enforcement of the various orders, arranged for the compulsory baking of bread—the bakers, 200 years ahead of their time, threatening a strike—and superintended the distribution of relief. These functionaries did not spare themselves, and every market day the Lord Mayor, or one of the Sheriffs, went down through the market place—to their idea taking their lives in their hands—so as to give confidence to the country people who still ventured to bring supplies into the town, and so help to avert the threatened famine. Considering the sea of troubles which faced these authorities it is difficult to see how they could have managed better than they did. A stranger descending on London at this time would have seen that something very grievous was amiss; multitudes of houses deserted and closed up, grass growing on the streets, sounds of lamentation everywhere, but he would hardly have guessed that over a thousand people dead of plague had been buried the night before, and that a thousand more dead of plague would be buried that night too. So as to lessen the outward and visible horrors of the times, as far as possible all funerals took place at night; the dead-cart went its rounds accompanied by criers, ringing a bell, and calling on the people to bring out their dead. The corpses were taken by bearers, carried to the cart and tipped into the nearest plague-pit, where they were covered over with earth before morning. In the case of those who fell down and died in the streets—as often happened—the bodies were covered with a cloth by the searchers, or removed to some city churchyard, where they lay until the cart came its rounds after dark. And in sad contrast to these rude attempts at decency, the poor creatures dying thus in the streets, usually had their pockets picked, or even their clothes stolen, before the breath was out of their bodies, so hardened and callous had the times become.

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As in former epidemics, the quarantine of houses was the main preventive measure adopted by the authorities. Examiners and searchers reported cases of plague and the infected houses were shut up, with their inhabitants inside—sick and well together—for one month, and guarded by watchmen night and day; and to add to the horrors of this useless quarantine, the poor creatures so imprisoned were often robbed, sometimes even murdered, by the vile wretches who were supposed to guard them. But when the recorded deaths had risen to over a thousand a day, this system of quarantine broke down, because the infected houses were too numerous to watch. Cats, dogs and swine were forbidden in the City, and thousands of cats and dogs were slaughtered by especially appointed killers, and multitudes of rats destroyed by poison. The people believed that these animals absorbed the effluvia of plague from the dead bodies and carried the infection in their coats and fur. They were coming very near the truth, but they still made the great mistake of supposing that man himself was the chief source of infection. This was the official view, and it was generally accepted; but even at this time, a dissident minority pointed out that those in attendance on the sick suffered no more, and indeed were usually affected less, than the rest of the population.

Two schools of sanitarians wrangled regarding the utility of lighting fires in the streets to purify the air of plague. One section condemned the fires utterly, the other upheld them just as vociferously. But the faction favouring fires was itself rent in twain, as to whether the fires should be of coal or of wood. And the party favouring wood was still further subdivided as to which particular kind of tree possessed these mysterious anti-plague properties in the largest amount. Till, the heavens growing weary of these futilities, rain fell in torrents and put the fires out, and the Lord Mayor, having more sense than the disputants, refused permission to have them lighted again.

During November, the fury of the plague abated, and by mid December the deaths had fallen to one-seventh of the number recorded a month previously, but plague continued in London throughout the whole of the next year. During 1665, in London the total number of deaths recorded from plague was 70,000, a figure which greatly understates the true mortality, because, to escape the horrors of quarantine, deaths, when possible, were recorded under some other heading. For example, the number of deaths returned from malaria this year was an absurd figure of over 5,000. And owing to the general chaos and confusion many deaths were never returned at all.

During 1665 and 1666 there were many outbreaks of plague in England, and Colchester experienced what is described as the worst epidemic of any provincial town since the Black Death; and in 1667 Nottingham suffered from a very severe outbreak, the last of its kind in England.

Following the epidemic of 1665, plague smouldered on in London, and deaths from the disease were recorded for the next thirteen years. But
after 1679 we hear of them no more, and some twenty years later the heading “Plague” was removed from the Bills of Mortality, and here ended the sad, eventful history of endemic plague in Britain.

Why did plague disappear? Probably several factors were concerned. First, the development of a sanitary conscience among the people created an environment unfavourable to plague, which is a disease of low civilization, of filth and overcrowding. No epidemic of plague in England ever began otherwhere than in the slums of some town, and any involvement of the country was always secondary to this urban infection. This was common knowledge for hundreds of years. The unknown author of the old ballad *Bessie Bell and Mary Gray*, describes how these girls, flying from the plague, built for themselves a bower beside a country stream:—

“They biggit a bower of rushes green,
And thekit it with heather—
But the pest came from the borough-town
And slew them both together.”

We can be quite sure that “the pest came from the borough-town,” and we can be equally certain that the borough-town was a dirty one.

It is usual, in this connexion, to give credit to the Great Fire of London, which is supposed to have scorched and burned plague out of existence. But this is not so, because the Parish of St. Giles' in the Fields, and the adjoining parishes and Liberties, the perpetual home and head-centre of plague, were not affected by the Fire at all. But the Fire of London had two very far-reaching indirect results. The Rebuilding Act of 1667, so as to lessen the danger of further conflagrations, forbade the use of lath-and-plaster houses in London, and directed that the walls of all houses must be built of brick or stone. This sealed the doom of the house-haunting *Rattus rattus*, a species which normally does not burrow, and which, in a climate like ours, is dependent for its continued existence on shelter provided by man. It could not cope with brick and stone walls, and driven outside, it met with the rigours of our climate, and later came into competition with the much hardier *Rattus norvegicus*, the common rat of to-day. Goldsmith, writing in 1774, says that the black rat used to be called the “common rat,” but it “is now common no longer.” If the dates given for the introduction of *Rattus norvegicus* are correct, endemic plague had then been absent from England for over forty years.

Rats in those days swarmed in numbers which seem incredible to us to-day. One writer records that when staying at an inn opposite a tan-yard, he noticed one evening the carcasses of thirty-six horses, stripped of their hides, thrown into the street—such being the simple method of disposal then adopted. And next morning he was interested to see the bones of the thirty-six horses picked absolutely clean and bare by the rats. And later, in Paris, when it was proposed to remove certain tan-yards, the people of the district protested to the Government and begged that the tan-yards should be left, asserting that if they were removed the rats deprived of
their usual food supply would turn on the inhabitants and devour them alive!

The second important section of the Rebuilding Act placed under a central authority all the scavenging and sanitary measures which previously had been carried out, or rather left undone, by the parishes themselves. This caused an immense improvement in the general sanitary condition of the streets, but even this altered condition would be very shocking to the ideas of to-day. But most important, as already stated, all this time the people were developing a sanitary conscience, and the conditions necessary for the prevalence of plague—filthy houses swarming with rats and fleas—were no longer tolerated, and so the great plagues which scourged Europe in the 18th Century left our shores untouched.

I fear I have already expended the allotted hour and a quarter, this time being the minimum for which I could decently be asked to speak, and the maximum that the fortitude of the audience might reasonably be expected to endure, so I must bring my discourse to a conclusion.

There are tens of thousands of people in this country who have heard, on innumerable occasions, the petition in the Litany beseeching deliverance from plague and pestilence, without comprehending, even dimly, what these words, plague and pestilence, would have conveyed to the petitioners only seven generations ago. If such people had only a little more knowledge, a little more imagination, they could understand for themselves the agony endured by the poor souls who uttered this petition, just as Friar John Clyn wrote his chronicle, *inter mortuos mortem expectans* . And having visualized this, they would then realize the horrors which they themselves have escaped through the operations of hygiene and preventive medicine.

The CHAIRMAN: Colonel MacArthur has given us an address of unique interest; I never remember having passed an evening here so pleasantly, or so quickly. We are the more indebted to him because the speaker whom we had expected this evening unfortunately failed us, and Colonel MacArthur came to our rescue at short notice. We had no copy of his paper, and we had no idea what he was going to tell us. Our confidence that we should spend a pleasurable and profitable evening listening to him, has been fully justified. I think his address was of such exceptional interest partly because he chose to tell us of matters which are not to be easily found in the plague literature of old times. I spent half an hour this afternoon in the London Library looking up some of those old records, and I cannot remember having found one of the references which Colonel MacArthur has brought to our notice. I did, however, find an account which I may mention in reference to Colonel MacArthur's remarks about the lady who managed to bury three husbands. I found the record of a man named Marshall Howe, who lived in a small village in the Peak district. He was said to be a man of gigantic stature and undaunted courage who undertook to do the burials for this small village. He did
burials of several hundred people. And during the period that the Plague lasted in this village he buried his own wife and two sons, married another wife and buried her too. Every time he buried anyone he took all their belongings and all the things in their houses. It is recorded that for a generation or two after the Plague the family people in that village used to bring their children to obedience by threatening to send for Marshall Howe. We shall be glad to hear any further historical points on this subject.

Dr. T. P. Beddoes, in proposing a vote of thanks, seconded by Sir Harry Waters, to Colonel Mac Arthur, described the address as the most eloquent he had heard from any medical man in any language.

Dr. P. H. Manson-Bahr and Dr. C. M. Wenten, having spoken, the Chairman said: There are two propositions; one is a vote of thanks to Colonel Mac Arthur for his admirable lecture; the second is that he will allow the substance, or if possible, the words, of this address to be printed in the Transactions. There is a very good reason for this, because Fellows who live abroad will not know anything about the address unless we print it in the Transactions. Therefore, it is very important that we should endeavour to persuade Colonel Mac Arthur to allow us to do so.

Colonel Mac Arthur, in response to the cordial expression of the vote of thanks, put by the Chairman, explained the reasons for his reluctance to agree to publication of his address with, perhaps, the little virtue it managed to acquire in delivery clean gone out of it in cold print.

It might well, he felt, be like the story of the shipwrecked sailor, a thirsty soul, who to his inexpressible emotion saw floating into his little creek a seemingly unopened bottle of beer. With an infinitude of exertion he got into juxtaposition to the prize. But prose was inadequate to describe the sequel, and so Colonel Mac Arthur fell back on the words of the poet:—

"'Tis an old Bass bottle comes floating from the sea,
'Tis an old Bass bottle comes floating unto me;
And inside is a message with these words written on:
'Whoever finds this bottle—finds the beer all gone!'"