



THE UNIVERSITY *of* EDINBURGH

Title	Diphtheria as observed in certain parishes in East Sussex, with special reference to its origin
Author	Skinner, Ernest William
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It was not until the publication of the New Sydenham Society's book in 1859 containing Memoirs by Bretonneau, Yrousseau and others, that the condition we now so frequently meet with was recognised and described as Diphtheria. A very concise account of the history of Diphtheria is given in Bretonneau's first Memoir, and he shows how in many countries and for many centuries, epidemics of this malady have been described by various authors under various names.

Many British authors have evidently described it. Bretonneau frequently quotes Starr, who in the middle of the 18th century observed an outbreak in Cornwall which appears to have been remarkable for the number of cases in which the false membrane was formed on abraded portions of the surface of the body.

Dr Thorne Thorne quotes various authors in his recent work "Diphtheria its Natural History &c" and especially he mentions Noah Webster who wrote of an epidemic in 1736.

In the Works of Thomas Sydenham published in 1740 I have come across a passage which possibly refers to Diphtheria

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and which I have not seen quoted elsewhere. Speaking of an epidemic of so-called Quinsy he says on p 210.

— He (the patient) can neither swallow nor draw his breath through his nostrils so that he is under the apprehension of strangling, by reason the jaws are stopped by the inflammation and tumours of the uvula, almonds and larynx and is indeed in a manner suffocated. There is great danger in this disease for it sometimes destroys a man in a few hours namely when a great deal of the febrile matter is cast upon the foresaid parts — Mackenzie in 1825, Hamilton in 1826 and Abercrombie in 1828 described affections of the throat which were probably diphtheria. Wherever and whenever it may have arisen in past times, certain it is, that diphtheria has prevailed more or less continuously in this neighbourhood for over thirty years.

It was very early in the sixties, 1861 I believe that my father the late Mr R. V. Skinner M.R.C.S. of Wincelsea first saw cases of diphtheria and he recognised in them a condition with which he had been previously unacquainted. The malady was very

generally supposed to have been imported from France and was popularly known by the name of the Boulogne sore throat. At short intervals it has cropped up over and over again in this district and I propose to narrate the occurrence of several cases which have come under my notice during the last four years and especially to consider their mode of origin so far as I have observed it. I greatly regret that I have no record or accurate recollection of the number and sequence of cases previous to 1889, so shall confine myself to what has happened since that date.

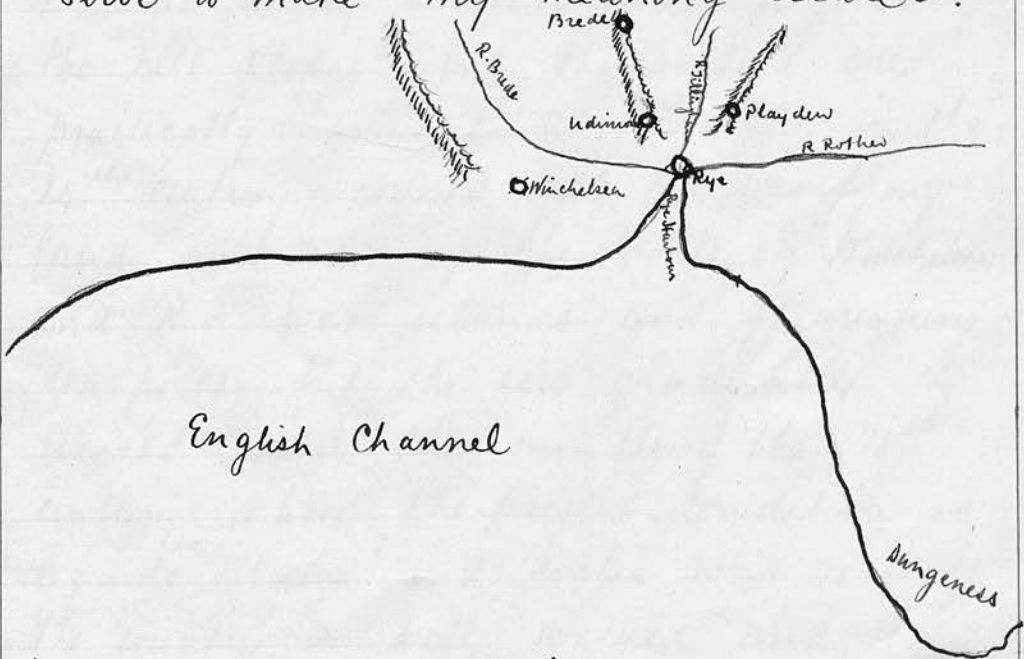
Although as one of the appointments of a general practice I hold the office of Medical Officer of Health for the Rye Rural Sanitary District with (in round numbers a population of 8000, and an area of 35000 acres, containing fourteen villages) I shall only speak of what has occurred in four parishes where all the facts have come to my knowledge; in fact almost all the cases occurred in my own practice. It is only through the courtesy of my medical neighbours that I occasionally

have heard of other cases as the Sanitary Authority has not adopted the Act for the Compulsory Notification of Infectious Diseases.

Although it is denied by many authorities that climate and soil have anything to do with the origin and prevalence of Diphtheria still I think it only right to preface what I have to say with a very brief account of the topographical and geological features of the part of the country to be dealt with.

The parishes I shall have to speak of are Winchelsea, Playden, Udmore & Brede.

The accompanying small map may perhaps serve to make my meaning clearer.



The above mentioned parishes are situated in

The Rye Union in the Eastern Division of the County of Sussex - The town of Rye with a population of 4000 is under the Urban Sanitary Authority and has a separate Medical Officer of Health.

The country consists of low-lying (50" to 750") hog-backed hills with intervening valleys and there is a strip of flat country between the sea and the hills which run practically at right angles to it. Winchelsea and Rye are on detached eminences about 120 feet above the sea level at the termination of the before mentioned low hill ranges. All the villages in the district are situated on hills similar and mostly parallel to those marked in the map, there are many scattered dwellings on the hill slopes but the valleys are practically uninhabited. The sea in the 14th century covered all the low-lying land and ran up the valleys; Winchelsea and Rye were islands and flourishing sea-ports but the sea gradually receded until the middle of the 18th century when the present condition as regards land and water was reached. The country is well watered and the natural springs and deep wells yield a

supply of water organically pure and of 9 to 11 degrees of hardness some of the springs are chalybeate. The geological formation is that variety of the Wealden known as the Hastings Sand consisting of layers of sand, soft sandstone, clay marl & hard rock with a thick subfacient bed of impermeable Fairlight clay. The upper layers are fairly permeable and the surface wells are from 10 to 20 ft deep and very liable to contamination being almost invariably placed for convenience close to the dwellings. The climate is temperate and the annual rainfall about 22 inches.

The population is almost entirely agricultural and the people as a rule are well clothed and fed; wages are fairly good the hop cultivation giving remunerative employment almost all the year round.

Diphtheria does not appear to be so fatal in this particular neighbourhood as in many places: during the last four years I have seen 53 typical cases besides a very large number of "suspicious" throats and among these 53 cases there were but 8 deaths being 15.09% as compared with 15.1%

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for the London Fever Hospital from 1886 to 1890, 38.4% for St George's Hospital 1888-1889, 46.9% for St Thomas' Hospital in 1888 and 42.5% for the Hospitals of the Metropolitan Asylum's Board in 1888-1889 (Thorne Thorne op cit p 201) and as many as 49.45% for the Paris Hospitals in the first quarter of 1876 (Quain's Dictionary of Medicine 1882 p 377).

And now I must briefly narrate the course of three epidemics with which I have had to deal.

In June 1889 I was called to see a boy aged 9 yrs at a cottage at Road End Farm Udimore, he was suffering from croup, there was no membrane to be seen on the ~~palate~~ soft-palate, tonsils or pharynx, he had appeared quite well the day before in fact he had been to school, his dyspnoea was not very urgent but was evidently increasing I gave him some Ipecacuanha and applied very hot fomentations to his throat and went on with my journey telling the parents I should be at home in four hours and that they were to let me know how he was by that time; I lived three miles from the cottage and intended if

he was worse to go back and perform Tracheotomy; when I got home he was dead. Two days later two of his little brothers fell ill with typical Diphtheria patches of false membrane on the throat with prostration and all the usual symptoms, in all there were four cases in that house subsequent to the first and they all recovered; but unfortunately the disease did not stop here for children in three other families attending the same school (two of them sat very near the first case) fell with Diphtheria and from these four foci 14 cases occurred within a month and three died out of a total population of 240.

Now it appears obvious that the first case of "croup" was responsible for the rest. There had been no previous sickness in the village and no sickness among animals. The cottage was situated in an isolated position about half a mile from the main road, the father of the patient was a labourer whose occupation had not taken him off the farm, the mother of a large family had plenty of work to occupy

her time at home and had not been away from her cottage except to the village shop and the children had not been anywhere except to the school. In making a careful examination of the home surroundings I found the privy situated behind the dwelling and at a higher level at a distance of six yards and close to it was a pig-stye. The privy cesspool was old ill-built and leaky and the ground all round including the floor of the cottage was saturated with sewage. I had the cesspool emptied and filled with dry earth and earth closets substituted there has never been any illness since although the house had always had the unenviable reputation of being unhealthy. It will be seen subsequently and it is an interesting fact that three years later this family immediately on moving to another dwelling two miles away where the sanitary surroundings were not good was again violently attacked by diphtheria. The next outbreak occurred in the little town of Winchelsea (500 inhabitants) in a row of cottages dignified by the

name of Barrack Square.

Curiously enough this began in much the same way as the Admore epidemic with the death of a child from Croup, Diphtheria not being suspected until another child fell with typical pharyngeal symptoms. There were altogether six cases in this row of cottages and two died.

As has been before mentioned Winchelsea was once a flourishing sea-port town and is to this day honeycombed with stone built and groined cellars intended for the reception of wine in bond, each is about 30 feet long 20 feet broad and 15 feet high and we found in more than one instance that they were being used as cess-pools! It being considered a great advantage that they scarcely ever needed emptying!! Such was the case in Barrack Square about 30 people used privies communicating with this ~~cellar~~ cellar which received in addition the slop water from 8 cottages and the waste water from two small laundries - it had not been emptied for 51 years - the stench was

very bad and the neighbours all said their health suffered in consequence we heard several complaints of sickness diarrhoea head-ache and other ailments and I myself remember two cases of a low form of pneumonia one was fatal in 1887.

I had the advantage of investigating this little outbreak with Mr Speat of the Local Government Board well known in connection with enquiries into many forms of disease and who may be remembered as having been associated with Professor Greenfield in his researches as to the nature and origin of anthrax. Every possible source of infection was enquired into in detail but with entirely negative results, the one obvious fact of the huge & pestiferous cess-pool alone remained, I should have mentioned that it stood about 10 feet from the end of the row of dwellings and that the slop water ran at the back of all the cottages in an open gutter till it reached the last cottage where it was conducted by a six inch pipe - untrapped - straight into the

cesspool. The cesspool has been emptied and refilled with earth & no suspicious sickness has since occurred.

One result of the above circumstances has been that I have been enabled to get Winchelsea provided with a proper system of sewerage and drainage and sewage disposal together with a good supply of water laid on to the houses.

Up to this point all the cases mentioned have occurred in my practice but in this last epidemic only four cases have so occurred but I have had to enquire into the outbreak in my capacity of Medical Officer of Health. I traced it back to a case occurring at Seasam in the parish of Playden so recently as January 10th of this year its subsequent spread was through the Playden School which was closed very shortly after the commencement of the outbreak. I have enquired most carefully into all possible causes but without success. I found the water of the well near the cottage contaminated and although it is seldom used for drinking I could not satisfy myself

that it is never so used; but the contamination was due to the soakage from a cesspool and thus the ground all round the dwelling was permeated with sewage. The type of disease has not been very severe out of a considerable number of cases there have been only two deaths, there have been a very large number of suspicious throats. So far I have mentioned twenty four cases out of a total of fifty three personally observed, and it is a circumstance I think of some significance that the remaining nineteen cases have all been sporadic that is they have either occurred singly or have not spread beyond the house in which they occurred. These nineteen cases occurred in altogether six instances so that with the three epidemics we find diphtheria starting on nine different occasions, in four years, in four parishes, with a total population of something under 2000. It is difficult to give exact populations as there are outlying portions of parishes which have not to be considered.

I will not waste time in entering

into all these cases it would only be needless repetition but I will say this, that although no other cause could be found, in no one instance could the Sanitary Surroundings at the site of the outbreak be considered in any degree satisfactory. I must briefly speak of an instance that occurred in Udinore on the 15th of December 1892. The family of Wood who were formerly attacked at Road End in 1889 had very recently removed to another cottage at School House Farm in the same parish but at a distance of two miles, there had been no Diphtheria in the parish since 1889. Within a week of their removal it was found necessary to open up the privy drain which was close to the cottage and the smell produced by this procedure was described as being very offensive; in quick succession six members of the family had Diphtheria and two died, no other cases occurred in the parish. I have known the place all my life and from personal recollection and enquiry

I think I am safe in saying there has never within man's memory been a case within two miles. This goes somewhat to prove what I have seen stated somewhere, I cannot remember where, that some families seem predisposed to contract the disease.

Were I to dogmatize solely from what I have myself seen I think I could only be led to the conclusion, that Insanitation and Diphtheria stood to one another in the relation of Cause and effect, that I know, is practically an exploded notion and the now usually received opinion is summed up in the following passage from Whitelegg's Hygiene and Public Health p286.

"Diphtheria is more severe and more prevalent among persons exposed to the foul gases from sewers and drains. The relation is however by no means so universal as the public has learnt to believe. Houses with the worst forms of drainage defects may remain free from diphtheria for an indefinite period and many cases of diphtheria occur in premises where no defect can

be found. The same may be said of other insanitary conditions, notably accumulations of manure and other filth in close proximity to houses. All these ought probably to be regarded as predisposing causes only."

I must defer the discussion as to the proximate causes of Diphtheria to consider for a moment what relation it bears, if any, to other morbid processes.

In speaking of the epidemic of this year at Playden I have mentioned the prevalence at the same time of "Suspicious throats" the same thing was noticed during the epidemic at Udimore and also at Wurchelsea. These throats may take the form of simple relaxed throat, quinsy, or more frequently, a form where there is congestion of the fauces and surrounding parts, making them of a characteristic deep purplish-red color, with generally spots of sticky yellow exudation - with false membrane. It is stated that paralytic symptoms sometimes occur after these throats but such has not come under my personal

observation. I used to think that a sharp line could be drawn between Diphtheria and any other throat affection, but I must admit having seen cases ⁱⁿ which it was practically impossible to make an exact, unhesitating and definite diagnosis; particularly where the substance of the superficial layer of the typically congested mucous membrane, has become of a dirty white opacity which has disappeared without the formation of false membrane; as if the epithelium had been attacked by the poison but not with sufficient violence to cause its death and disintegration. I have seen suspicious throats run through several members of a family & then one would have typical Diphtheria. I have seen a case of true Diphtheria occur first in a household & be followed ~~by~~ other suspicious throats, and no more true Diphtheria; also I have observed throats that could not be distinguished from these when no Diphtheria was about.

Dr Thorne Thorne op cit p 54 says -

"I take it indeed that there is practical unanimity of opinion among skilled observers as to the association with Diphtheria of certain throat affections which if met with apart from cases of the recognized disease would certainly not be regarded as having any definite relation with it" and he goes on to show how cases of simple throat affection arising in the most isolated places have led by transmission through other persons to cases of well-marked and severe Diphtheria and he says p 59 "It has been difficult to interpret their occurrence except on the supposition that in some way they have arisen independently of prior cases" and he provisionally explains the matter by assuming the theory of the "progressive development of the property of infectiveness"

Besides its association with the before mentioned suspicious throats Diphtheria is believed to bear a relation to other diseases both in animals and man. With regard to the diseases of animals,

cows and cats especially are believed by some observers to suffer from a malady which although modified by its host, is practically identical with Diphtheria in the human subject. In spite of the work of Klein and others in this field, it is a matter on which judgment is for the present suspended and as it has never been my lot to have seen or suspected the transmission of Diphtheria from man to animals or vice-versa I do not propose any further to discuss this phase of the subject.

Diphtheria has long been associated by many writers with scarlatina, in fact some have gone so far as to assert the identity of the two conditions, only twice have I seen any apparent relationship between the two maladies. The first case is not one of the 53 first alluded to as it occurred in 1887 in the parish of Guestling close to Hastings & not in the district of the R.R.S.A. A girl of 18 who had assisted in nursing a case of Diphtheria at a convalescent home at Hastings fell ill within 24 hours of her return to her own home. She had the typical throat of Diphtheria

when I first saw her, the next day there was a rash on the chest of scarlatinal type but scanty the peculiar point about the case was that she suffered from the sequelae of both affections namely (1) well-marked Paralysis & (2) Dropsy she died from sudden heart failure at the end of three weeks.

Last year a sporadic case of Diphtheria occurred on the outskirts of Winchelsea the throat was typical there was no rash and no desquamation. One of the children of a family living three miles away played with this child while it was sickening, and in two or three days developed scarlatina this she gave to her three brothers and sisters while the father had a sore throat with no rash but he desquamated.

The following train of circumstances is somewhat suggestive of a possible relationship between Erysipelas and Diphtheria. Here again the cases are not among the 53 first referred to. In the summer of 1887 I attended a family in one of a group of four cottages at Bude Hill, suffering from typical Diphtheria, there were four cases and no deaths

before the last one had recovered the mother had acute Erysipelas of the leg. This family left the cottage and in the spring of 1888 some weeks after the new family had entered the premises a girl of 12 years of age had acute Erysipelas of the leg. In March 1889 when some suspicious throats were prevalent another case of acute Erysipelas occurred in an adjoining cottage. I do not wish to be thought to attach any very grave importance to the above circumstances happening as they did at rather considerable intervals of time but I look upon it as worth bearing in mind in view of future possible contingencies. I may add that the surroundings were highly insanitary, but much has now been done to remedy the usual cottage environment of leaky cesspools, unfointed drains & untrapped sinks.

So much for facts that I have myself observed and now in order to rightly understand their meaning it becomes necessary to interpolate an epitome of the bacteriology of Diphtheria so far as I have been able to gather it. I find

That at the present time two bacilli are so to speak in the field firstly that discovered by Klebs and investigated by Löffler, and secondly that described by Klein. I must quote largely from Woodhead's book "Bacteria & their products" in the case of the Klebs-Löffler organism and from Klein's report to the Medical Officer of the Local Government Board for 1889 as regards the bacillus identified with his name. There are present in all diphtheritic membranes large numbers of micro-organisms which find there a suitable medium for growth but no one supposes or maintains that the great proportion of them have anything to do with the causation of the disease.

Woodhead says on p 298

"In 1875 Klebs found in the false membranes a small bacillus with rounded ends and with here and there small clear spaces in its substance, a bacillus that was not readily stained that grew luxuriantly in broth and which inoculated into animals gave rise to a dirty fibrinous looking slough at the seat of inoculation. He found

however that in certain cases this bacillus was absent the predominating organisms then seeming to be a micrococcus arranged in masses or short chains. This when cultivated in broth gave rise to the formation of chains of considerable length. As a result of these observations he described Diphtheria as occurring in two forms one form resulting from the action of one organism the second being caused by the other. These researches were continued by other workers and Yormad in America came to the conclusion that the rod-shaped bacillus had little to do with the disease but that the streptococcus or chain-forming micrococcus was the real exciting cause. Matters remained at this stage for some time in fact until Löffler took up the subject. After examining a number of cases of Diphtheria he found that although there are numerous organisms in the false membranes or diphtheritic patches these were mostly near the surface and many of them were simply the organisms that are usually found in the mouth now growing under more favorable conditions of nutrition. He found however that in

The deeper layers or at the inner margin of the layer of exudation the Klebs bacillus might almost invariably be found. It was more deeply situated than any of the others and was always most numerous in the oldest part of the membrane. This was in cases of pure diphtheria. In the so-called diphtheritic sore throats met with in other diseases especially in scarlet fever the streptococcus appeared to be the predominant organism.

The Klebs bacillus will not grow on gelatine at the ordinary room temperature it is 3 to 6 μ in length straight or slightly bent and one end or both sometimes slightly swollen. It tends to lose its virulence on cultivation.

on p 302 Woodhead says -

"It was left to Rouse and Yersin to demonstrate the intimate causal relation that actually exists between this organism and true diphtheria. They repeated Coffer's experiments of inoculating the bacilli on the damaged mucous membrane of rabbits, guinea pigs and pigeons and in all cases they proved that characteristic diphtheritic patches were produced.

Injected under the skin the bacillus causes swelling at the point of inoculation

and the animal dies with symptoms of acute poisoning. In some cases there is found congestion and effusion into serous cavities in others there is evidence of fatty degeneration of the liver similar to but more acute than that met with in cases of diphtheria in the human subject. A very important point determined by them was if death did not take place too rapidly characteristic diphtheritic paralysis usually supervened."

From pure cultivations of the bacillus a chemical product has been obtained which injected gave rise to all the symptoms produced by the injection of the bacilli, less the diphtheritic patch of false membrane.

I think I have quoted sufficiently to convey a correct impression of the nature of the Klebs-Löffler organism and must now turn to the Bacillus Diphtheriae of Klein. In order to make room for his own bacillus, Klein had, so to speak, to endeavour to clear the field of its occupant the Klebs-Löffler organism and this he has tried to accomplish by the following series of experiments.

He either injected subcutaneously or

rubbed on to the abraded mucous membranes of rabbits, fowls and pigeons, small portions of actual false membrane from cases of human diphtheria, the results were purely negative and no organisms beyond micrococci were found either at the seat of inoculation or in the blood and tissues of the body; from these experiments Klein deduces his first proposition viz (vide op cit p 431)

"I think from this I am justified in questioning the transmissibility of human diphtheria to rabbits fowls and pigeons. The Klebs-Löffler bacillus with which Löffler as well as Rousc & Yersin carried out experiments on these several species of animals and by the application of which ^{to} the scraped mucous membrane of the fauces it has been maintained that (diphtheritic) pseudo-membranes have been produced was indeed derived from the diphtheritic membrane of human cases, but it seems to me questionable, whether the positive pathogenic results obtained by those observers in these as well as in other animals (guinea-pigs) after subcutaneous inoculation of the Klebs-Löffler bacillus

can be put down as indicative of Diphtheria.
 As to the pathogenic results that I myself
 obtained by subcutaneous inoculation
 of guinea pigs I think it would be
 unjustifiable to consider them as
 indicating Diphtheria."

His second series of experiments was
 performed in the same way as the
 first substituting cultures of the
 Klebs-Löffler bacillus for pieces of actual
 diphtheritic membrane from the results
 of these experiments he deduces the
 following summary p 434.

(1) Cultures of the Klebs-Löffler bacillus
 proved virulent to guinea-pigs on subcutaneous
 injection into the groins of these animals
 and the appearances after death were
 those described by Löffler. This suffices to
 show that the cultures were active and
 had not become in any sense attenuated
 or lost of power.

(2) The same cultures just like the
 diphtheritic membrane itself proved
 perfectly inactive when applied to
 the abraded cornea, to the abraded
 cutis or to the abraded mucous membrane
 of the fauces of rabbits.

(3) The same cultures just like the
 diphtheritic membrane itself proved

wholly inactive when applied to the abraded mucous membrane of the fauces and entrance of the larynx of fowls & pigeons

(4) The same cultures proved inactive when applied to the abraded mucous membrane of the fauces of guinea-pigs.

(5) The same cultures proved inactive when injected into the jugular veins of rabbits.

Hence ^(he says) I am unable to admit either for diphtheritic membranes or for cultures of the Klebs-Löffler bacillus any specific diphtheritic action on fowls pigeons rabbits or guinea-pigs.

He then experimented in the same way on cats with the Klebs-Löffler bacillus, his first two died on all others no effect whatever was produced. Commenting on this he says p 435.

"From these experiments I conclude that cultures of the Klebs-Löffler bacillus produce no specific effect in cats; the fatal result in the first two experiments having been manifestly due to secondary purulent infection from the experimental wound in the skin and subcutaneous tissue."

He next experimented on cats with human diphtheritic membrane and with the

diseased tissues so produced, he experimented on a further series of cats and as regards the results produced he speaks as follows p437.

"The inference to be drawn from these last two series of experiments is that it is possible to produce by the application of human diphtheritic membrane to the corneal conjunctiva and to the palate of cats a severe inflammation running a definite course and associated with ulceration of the inoculated tissues and formation thereon of purulent membrane, and further that the disease thus induced is itself in turn transmissible to healthy cats. On the other hand the diseased condition referred to is not produced by application of non-diphtheritic purulent matter in the same manner to the same organs. It must however be stated that the disease thus induced in the cat bears only a slight resemblance to human diphtheria the characteristic thick, firmly adhering, whitish membranes are not present in the induced cat malady."

He then proceeds to describe a bacillus which he saw in several instances in cover glass specimens of diphtheritic

membranes, morphologically it is something like the Klebs-Löffler organism but it is shorter and the ends are not generally so rounded. On p 438 he says.

"Some of the longer bacilli showed segregation of the protoplasm within the sheath as two three or more small deeply stained granules of unequal size. Some of the shorter bacilli also showed one or two such granules. These longer bacilli are hardly distinguishable from streptococci and but for the presence of intermediate forms might easily be mistaken for them. In some membranes from acute typical diphtheria cases these bacilli are very numerous; they occur in larger or smaller clumps and besides are scattered about singly and in isolated groups of twos & threes. Some individual bacilli are slightly curved and some of the larger ones are bent in an angle or a curve, chains of these thin bacilli are also met with."

Having now apparently proved that diphtheritic membrane & the Klebs-Löffler bacillus are both

non-specific in their action on rabbits, guinea-pigs, fowls & pigeons, also that the Klebs-Löffle bacillus is innocuous as regards cats while diphtheritic membrane is in a manner specific in its action on cats & then having introduced his own bacillus to our notice, I quite expected to read that cultivations of his own bacillus from human diphtheritic membrane inoculated on the surface of the abraded cornea or mucous membrane of the palate of cats, had produced the same specific effect as had the diphtheritic membrane itself; thereby he would have gone far to prove that the *Bacillus Diphtheriae* of Klein was the actual morbid agent in the diphtheritic membrane, thus however he has not done and the conclusion of his paper I will endeavour to put in as few words as possible apologizing for the long quotations I have felt bound to make rather than run the risk of altering the meaning of the various passages by the use

of my own language.

He shows that from the cornea of cats, inoculated with human diphtheritic membrane, can be isolated a bacillus whose morphological peculiarity is its extreme thinness. This organism grows on nutrient gelatine at 20°C (which the Klebs-Löffler bacillus will not do) and from these cultures is obtained a bacillus thicker than the actual cat bacillus and in all respects morphologically identical with those obtained from the false membrane of diphtheria in the human subject.

Now I call this a lame and unsatisfactory conclusion, it is true he has in a measure succeeded in discrediting the ^{results of the} work of Klebs, Löffler, Roux & Jensen without to my mind establishing anything in its place. So far as I can see all he has proved is that cultivations of the thin bacillus obtained from the cornea of a cat inoculated with human diphtheritic membrane

have become under cultivation
morphologically identical with
 a bacillus he has observed in
Several instances to be present
 in human diphtheritic membrane.
 I have always read and been
 lead to believe that mere
 morphological peculiarities
 without corroborative evidence
 were comparatively speaking
 worthless when seeking for
 pathogenic qualities. I have
 sought in vain for further
 work from Klein to throw
 more light on this matter
 but only this month (March)
 I am told by my bookseller
 that he cannot find any.

And so as regards the bacillary
 origin of Diphtheria we are
 left with no very certain
 ground to stand on. I cannot
 help thinking and I have long
 thought that in seeking to find
 in one specific microbe, or in
 the products elaborated by that
 one organism, the cause of a
 particular malady we may
 perhaps be sometimes beside

the mark. If it be true as I hold that clinical observation has as good as proved that there is a relationship between Diphtheria, other sore throats, Scarlatina, Erysipelas & as some observers hold, measles how can we suppose that one morphological unit with specific pathogenic properties can be concerned, single-handed, in the origin of more than one of them?

Assuming the correctness of Thorne Thorne's theory of the progressive property of infectiveness; I take it to mean that a comparatively benign germ such as would produce a "Suspicious throat" may by reason of the nature of its environment acquire more virulent properties. This seems so highly probable that I should like to go further and ask whether an ordinarily benign germ may not under certain circumstances acquire a "specific infective capacity" for producing a certain disease? For example allowing for the moment that the

Klebs-Löffler bacillus is largely concerned with the origin of Diphtheria we are at once confronted with the statement of Löffler that he found this identical species of bacillus in the mouth of a perfectly healthy child, & Hoffman also found a bacillus identical in morphological and cultural characters with the Klebs-Löffler bacillus constantly present in the mucus of the human pharynx. The answer to this is that ^{the} mucous membrane is intact and therefore unattainable (Klein denies this & says that owing to the presence of diffused lymphatic tissue & closely aggregated lymph follicles in the mucous membrane of the fauces there is no difficulty in finding a breach of surface. But this is very different to a damaged mucous membrane with consequent impaired cell-vitality.) However, is it not a reasonable supposition that in the presence of an actually damaged mucous membrane and of microorganisms

found in the air of sewage-saturated dwellings the Klebs-Löffler bacillus might acquire the "specific infective capacity" of producing Diphtheria?

And here I should like to quote a passage from Woodhead's book. The only passage I have found anywhere which appears to lend color to the idea which I have for some time held to be possible. On p 312 he says.

Another feature is brought into special prominence by recent researches on Diphtheria is that the attenuated Diphtheria bacillus requires the fulfilment of certain conditions before it can again acquire the virulent form; one of these being that it shall be allowed to grow on the surface of the fauces or outside the body altogether in the presence of certain organisms such as Streptococci found in Erysipelas or those Streptococci that occur in the throat affections of Scarlet fever, measles & similar diseases. I do not see why the micro-organisms

of putrescent sewage might not be quite as efficacious in restoring virulence to an attenuated bacillus as the streptococci of Erysipelas, scarlet fever &c.

And if it be possible in any way to restore virulence to an attenuated bacillus does it not seem feasible that malignity might be conferred on an ordinarily benign germ?

And as the course and nature of alcoholic and other fermentations is influenced and modified by the presence of wild yeasts; may not the course & nature of diseases be altered by the presence of wild or subsidiary organisms?

And if we admit for the moment that a benign germ may acquire malignant properties by reason of its environment are we to assume that that single morphological unit is the only one capable of acquiring such properties? If not we are more readily in a position to understand the evidence of different trained observers who by a process of laborious investigation ascribe the same properties to different bacilli.

And if we provisionally admit the theory of "wild pathological germs" does it not help us to understand how

different conditions are found to arise under
 apparently similar circumstances, e.g. ^{Scutellaria} Diphtheria.
 I have refrained from elaborating these
 ideas too much as it does not appear
 to me to be wise to raise an imposing
 superstructure on insufficient foundations.
 I do not even advance them as serious
 propositions but merely as legitimate
 speculation on a subject which has
 largely occupied my thoughts.

In conclusion I have only to add that
 I have received no help whatever in
 the composition of this Thesis and
 wherever quotations have been used I
 have given exact references.

Ernest W. Skinner MB+ChM 1885