site of a perforating ulcer is the one in which it occurred in this man, that is to say, under the ball of the great toe. It ordinarily begins as a corn, and this corn or thickening of epithelium is ultimately followed by an ulcer which penetrates—or bores—deeply, and gives rise to this name of perforating ulcer. It does not extend over a large area, but tends to perforate without making any very large open sore. It is very liable to quickly penetrate the joint, and in not a few cases it results in some destruction of bone, either by caries or by actual necrosis. Our patient here has lost a considerable amount of bone from both feet, so that the toes are very much shrunk and shortened. But yet at present they are perfectly sound. And there again I want you to remember that perforating ulcers are things which can get and can remain perfectly well. There is a tendency to believe that a perforating ulcer necessarily cannot get well, that amputation may be required for it, and even then it is liable to recur in the stump. This man's statement is of some importance. He stated that the ulcers always reopened if he took alcohol in any form, and that they healed readily if he left off the alcohol. You know that alcohol is liable to cause neuritis; and I am certain that there are a good many people who have perforating ulcers who do not get well if you allow them to take alcohol. The other thing to remember is that if this ulceration is treated so as to relieve the part from pressure and to get it clean and aseptic, then, so long as there is no actual dead bone remaining behind, these sores can heal and can remain perfectly well.

INCONTINENCE.

I have spoken so far of the surgical complications in the limbs; but this man of whom I am speaking said he had occasional attacks of incontinence of urine and faeces. Those are complications which you must keep in mind, because a patient may come to you complaining of nothing suggestive directly of tabes, but on account of some trouble connected with urination. He may come because he has difficulty in passing his water, complaining that he cannot begin; or he may tell you that at times, without any particular cause, he has a sudden desire to empty his bladder, and, whether he will or not, the bladder insists upon emptying itself, so that he may easily pass his urine into his clothes unless within a few moments of being called upon to empty his bladder he can empty it into a suitable receptacle. In such cases tabes is often overlooked and the incontinence is put down to all sorts of other conditions; but incontinence, especially spasmodic incontinence, is very suggestive of tabes, and, like many of the other tabetic lesions I have spoken of, it may be quite transient. This man has had no trouble for some years; it was there for a time in the same way as diplopia may be there for a time, and, like that, it may pass away. The same is true of the rectum. It is, fortunately, not so common, but here again there is this same sudden call to pass the motions, and under these circumstances again, whether the patient will or not, the rectum insists upon emptying itself. But you have this satisfaction, that it seldom persists even in bad and progressive cases of tabes, and gradually or suddenly passes away.

GASTRIC CRISES.

In a certain number of these cases there are sudden attacks of violent sickness. This man has not had any such troubles, but the woman, whose case I read to you, and who had spontaneous fractures, was liable to these attacks of sudden vomiting without any feeling of nausea, and quite independently of food. And there, again, that is, in most cases, a transient condition.

EYE SYMPTOMS.

One other complication in our patient is grey atrophy of the optic disc on one side and loss of a great deal of vision. The eye may be affected in various ways in tabes. I mentioned to you first of all that there may be diplopia and squint. In the next place, there may be grey atrophy—that is to say, there may be atrophy of the optic disc, which assumes a curiously pearly-grey appearance—not a white appearance, such as might occur after acute optic neuritis, or after severance of the optic nerve, but the characteristic greyish appearance which gives rise to the name. Here, again, you must remember that, although there may be rapid atrophy, it may come to an end. This patient has never completely lost his vision, but he was

losing it in one eye so rapidly that at one time it looked as if he were going to become completely blind on that side. The other eye has not been materially affected.

PROGNOSIS IN TABES.

I want you to keep this man's case in mind in connexion with all these complications which I have mentioned, because they illustrate that tabes may be a very chronic disease; that, after having progressed up to a certain point, it may cease to progress; and that all these various symptoms and complications, even such things as disease of bone, alterations in joints, etc., may all, or any of them, be transitory. Under those circumstances you must not give too bad a prognosis; you must not think that everybody who begins with tabes is necessarily going to continue to get worse. The patient's symptoms may either progress or the disease may be arrested, and the arrest may occur at either an early or a comparatively late stage of the disorder. It is seldom that all the complications come together. You know that they may arise, but you must not forecast them and predict that they will arise, because they do not necessarily do so. And the outcome of this is that, as far as treatment is concerned, you must not look upon these cases as incurable in any way. It is true you cannot do much to alter the progress of tabes. The main thing which you can do is to improve the general nutrition of the patient. Antisyphilitic remedies, as I have said, are of no use. You should treat surgically all these various complications, feeling you are justified in encouraging the patient to believe that most of the complications are transitory. In the case of the man of whom we have been speaking, he is now able to walk about and earn his living, because he was carefully splinted and kept quietly in bed at the time when his joints were rapidly becoming worse and tended to become dislocated. It is because this woman who had fractures was treated like anybody else with fractures that there was a chance of their mending, and therefore I say you must take an encouraging view of the complications of tabes, and not neglect to treat them with every care.

THE BACTERIOLOGY OF A "COMMON COLD."

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THOUGH colds are almost universal during the winter months, and their remote effects possibly much graver than is usually supposed, the subject has been very imperfectly investigated. I have endeavoured to throw some light on the question by the bacteriological examination of a series of 27 cases of mild "common cold" occurring in the neighbourhood of Brighton from November, 1905, to January, 1906. The work has been carried out at the Stephen Ralli Memorial of the Sussex County Hospital, under the direction of Dr. Bushnell, whose help and advice have been invaluable, and I should like to acknowledge the kindness of Dr. Gordon Dill, who suggested the research, and other members of the staff of the Hospital, and also several colleagues, who provided some of the clinical material.

The literature bearing directly on the subject is scanty.

In 1873 Hüter¹ described a micrococcus as a cause of coryza.

In 1890 Paulsen² mentioned the occurrence of various cocci and bacillary forms in common colds.

In 1894-5 Dr. Edmund Cautley³ examined 8 cases of common cold, and in 7 of them isolated a bacillus which he named the *Bacillus coryzae segmentosus*.

This bacillus was subsequently found by Dr. Gordon⁴ of St. Bartholomew's Hospital in all of 7 cases examined.

In 1906 Dr. Prosser White,⁵ of Wigan, examined 21 cases of common cold. His experiments will be published in book form shortly. He finds a bacillus probably identical with that of Cautley in 17 out of 21 cases, that is, in 81 per cent. Inoculation experiments on the noses and genital tracts of guinea-pigs, rabbits, and monkeys, were negative.

The only positive results which I have been able to ascertain were those of Gordon in 1902, who injected 2 guinea-pigs with a pure culture of Cautley's bacillus, and observed that they were evidently ill for a few days, but recovered.

Literature dealing with more severe epidemics simulating influenza is abundant, and a large number of such epidemics are recorded in which Pfeiffer's bacillus was not found.

Hajek,⁶ in 1838, described in such an epidemic a *Micrococcus nasalis* and a *Diplococcus coryzae*.

Seifert,⁷ in 1889, described cocci 1 μ in diameter in an influenzal epidemic.

R. Pfeiffer,⁸ about the same time, described the *Micrococcus catarrhalis* as occurring in an extensive epidemic of mild febrile bronchitis, and considered it to be identical with one or other of the cocci described by Hajek.

Lord,⁹ in 1903, compared the *Micrococcus catarrhalis* with the meningococcus of Weichselbaum, and drew attention to the differential diagnosis between the two organisms.

Besançon and De Jong,¹⁰ in 1905, found the *Micrococcus catarrhalis* in an epidemic of influenzal type occurring in Paris.

Dunn and Gordon,¹¹ in 1905, wrote an extremely able and comprehensive paper on a severe epidemic occurring in Hertfordshire, in which the *Micrococcus catarrhalis* appeared to be the principal organism.

The question of diphtheroid organisms has been much discussed. Since Loeffler¹² in 1887 first described non-virulent bacilli resembling the *B. diphtheriae*, numerous observers have drawn attention to organisms more or less resembling the Klebs-Loeffler bacillus. In 1888 Hofmann¹³ described the bacillus which bears his name. Roux and Yersin found that there exist non-virulent forms, which they considered to be attenuated forms of the *B. diphtheriae*. Gordon,⁴ in his paper on the *B. diphtheriae* and organisms liable to be confounded therewith, classifies diphtheroid organisms thus:

1. *B. diphtheriae*—virulent to animals.
2. Organisms having all the characters of *B. diphtheriae* except that they are non-virulent to animals.
3. Organisms not having all the characters of *B. diphtheriae*, but somewhat resembling it.

In this latter class he places Hofmann's bacillus, *B. xerosis*, and Cautley's bacillus, and others as yet unclassified.

Ford-Robertson¹⁴ has shown that diphtheroid organisms are present in cases of general paralysis of the insane. Eyre and Flashman¹⁵ do not support this, but find diphtheroid organisms in the throats of insane patients in much the same proportion as in the sane.

A diphtheroid organism, the *Bacterium muris*, has been found by Klein¹⁶ in rats and mice, and another diphtheroid bacillus was described by Foulerton¹⁶ as occurring in the human uterus in cases of puerperal fever.

THE BACTERIOLOGY OF NORMAL NASAL CAVITIES.

Earlier observers, for example Thompson and Hewlett,¹ regarded the nasal cavity in health as sterile. More recent observers consider that it normally contains such organisms as staphylococci, streptococci, and pneumococci, in fairly large numbers and diphtheroid organisms occasionally. Hesslauer¹⁷ (1902) and Lewis and Logan Turner¹⁸ (1905) give statistics of organisms found in healthy nasal cavities.

It is interesting to compare their results with regard to staphylococci, streptococci, and diphtheroid bacilli with those which I have obtained in 21 cases of common cold. Table I gives such a comparison, and it is interesting to note that my figures for staphylococci and streptococci, worked out as percentages, are almost identical with Lewis and Logan's figures, but that the cases of cold show an enormous increase in the number of diphtheroids present.

TABLE I.

	Twenty-one Cases of "Common Cold."	Twenty-six Specimens from Normal Noses (Lewis and Logan Turner).	One hundred and eighty-six Specimens from Normal Noses (Hesslauer).
	Per cent.	Per cent.	Per cent.
Staphylococci	48	50	25
Streptococci	24	23	17
Diphtheroid bacilli	95	8	13

N.B.—In the above table the figures are expressed as percentages for purposes of comparison.

It will thus be seen that in my cases there was a very marked increase in the number of diphtheroids, whereas staphylococci and streptococci occur in much the same proportion as in normal nasal cavities. The technique which I adopted was very similar to that of Lewis and Logan Turner,¹⁸ but it must be noted that my cases refer to throats as well as noses.

METHOD OF EXAMINATION.

Mild cases of common cold were chosen at random from patients of all ages and classes of society.

The symptoms were usually sore throat, sneezing, malaise, and headache, with more or less nasal discharge. Muscular pains in the back and stiff neck were fairly common. Nearly all the patients were well enough to be about and following their usual occupation, and none of them could be said to be seriously ill. A rise of temperature of a degree or two was observed in some of the cases, but opportunities for clinical observation were necessarily few.

In some cases, especially those with painful sore throat and muscular pains, and very little nasal discharge, a sub-normal temperature was noted on several occasions, and these patients complained of feeling very depressed. In view of the recent work on the question of diphtheroid organisms in cases of general paralysis of the insane, this point is of some interest and will require to be more fully worked out.

The observations on these cases were made as early as possible, usually on the second or third day, though in some cases at a much later period.

Technique.

Sterile swabs were prepared by heating to 175° C. in an oven. In taking nasal swabs, a solid-bladed nasal speculum was used which had been sterilized by boiling. The throat swabs were taken as far as possible from the posterior pharyngeal wall.

Film preparations were made from the swabs and stained with carbol-methylene blue, or by Gram's method. The swabs were then inoculated direct on tubes of inspissated ox serum labelled N. and T. respectively. These were incubated at 37° C. for twenty-four to forty-eight hours. Subcultures were then made on nasgar plates, from which isolated colonies could be picked out and transferred to tubes or plates of nasgar or other media as required. Nasgar is a medium prepared from nutrose, ascitic fluid, and ordinary agar (Dunn and Gordon¹¹). Invented by Wassermann for the gonococcus, it is an excellent medium for the growth of delicate organisms such as the *Micrococcus catarrhalis*, which is liable to be overlooked unless a suitable medium for its growth is provided.

In examination of the cultures Gram's method of staining was employed, using the short times recommended by Dr. Gordon¹¹—namely, three-quarters of a minute each in aniline-gentian violet, and Gram's solution respectively; 1 per cent. aqueous solution of carbol-fuchsin was used as a counterstain for a few seconds to show up the organisms not stained by Gram's method. In cases of doubt a control was introduced by placing a minute quantity of a known organism, such as *Staphylococcus pyogenes aureus* or *Bacillus coli*, on one corner of the coverslip.

STATISTICS OF CASES.

Of the 27 cases examined, 6 were patients in isolation hospitals suffering from common colds, and it seemed best to exclude these from statistical consideration (Table II). They are, therefore, appended below in the table, and are not included in the figures on which the conclusions arrived at in this paper are based.

Diphtheroid organisms were found to be present in 20 cases out of 21—that is, 95 per cent.—and were isolated in 5 of the cases, also in one of the sanatorium cases.

Cocci negative to Gram's stain were seen in 10 out of 21 cases—that is, 48 per cent.—and isolated in 2 cases.

Other cocci positive to Gram's stain were seen in 14 cases—67 per cent. Some of these were undoubtedly pneumococci. They were not present in large numbers in any of the cases, nor was it found possible to isolate them.

Pfeiffer's bacillus, though carefully looked for, could be found in only 2 cases in small numbers, and was not obtained in pure culture. Its microscopic appearances were as follows:—Short rods, smaller than a pneumococcus, negative to Gram's stain, and showing bipolar staining with carbol-fuchsin. This corresponds with the appearance of the influenza bacillus,¹⁹ but in the absence of cultures the diagnosis is, of course, uncertain.

Other organisms were found in small numbers, much as in normal throats and noses.

TABLE II.—Statistics of Organisms found in a Series of 21 Cases of Common Colds, with 6 Cases appended of Common Colds occurring in Isolation Hospitals.

Case No.	Diphtheroids Seen.	Diphtheroids Isolated.	Cocci, Gram — Seen.	Cocci, Gram — Isolated.	Streptococci.	Staphylococci.	Diplococci, Gram +.	Bacilli, Gram —.	Bacilli, Gram + other than Diphtheroids.	M. Tetragenus.	Sarcinae.	Torulae.	Streptothrix.	Pfeiffer's Bacillus.	Spirochaete.	Isolated cocci, Gram +.	Very Minute Cocci, Gram —.
1	+	+	+		+	+	+				+						+
2	+	+	+			+	+	+			+						+
3	+	+				+	+	+									
4	+					+	+	+	+								
5	+						+	+	+								+
6			+		+		+	+	+	+							
7	+		+			+	+	+	+						+		
8	+					+	+	+	+								
9	+					+	+	+	+								
10	+		+		+	+	+	+		+							
12	+				+	+	+	+									
13	+					+	+	+		+							
14	+					+	+	+						+			
15	+	+	+			+	+	+									
16	+		+	+		+	+	+									
17	+	+	+	+		+	+	+									
18	+		+				+	+									
19	+							+									
20	+								+				+				
26	+	+							+					+			
27	+	+	+				+		+							+	
21 cases	20	5	10	2	5	10	14	4	4	3	3		2	2	2	1	3
11	+		+			+	+							+			
21	+		+														
22	+				+			+				+					
23	+	+															
24	+	+	+			+											
25	+																

A DIPHTHEROID BACILLUS.

The main feature of the series is, therefore, the almost constant occurrence of diphtheroid bacilli. Pure cultures were obtained in 5 of the series of 21 cases, and in 1 of the 6 sanatorium cases. The cultural characteristics and microscopical appearances of these were remarkably uniform, and were similar to those of Cautley's bacillus.³ I therefore conclude that a single organism was present.

Cultural Characteristics.

On *gelatine*, at 22° C., I usually failed to obtain growth, but in one case a faint streak consisting of white circular colonies was obtained.

Fig. 1.—Photograph of colonies after twenty-four hours' growth on hydrocele agar at 37° C.

On *ordinary agar*, *ascitic agar*, and *nasagar* a fairly abundant growth appeared within twenty-four hours, consisting of whitish translucent streaks made up of minute circular colonies. On the third day the growth is not quite so vigorous as that of *B. diphtheriae*. The individual colonies are seen to be circular, and confluent where the growth is abundant. Under a low power the colonies are finely granular, rounded, with entire or slightly wavy margins. The edges of the colony are thinner than the central

portion. The colour, by transmitted light, is brownish-yellow.

Stab cultures on agar show growth all along the streak, and a fairly vigorous surface growth.

In *peptone bouillon* turbidity appears in twenty-four hours, and a stringy precipitate sinks to the bottom of the test tube. In two or three days the fluid again becomes clear, leaving only the precipitate.

Fig. 2.—The same colonies under 3 in. objective.

Biochemical Reactions.

I have endeavoured to ascertain the reactions of the bacillus to various media, according to the method adopted by Dr. Gordon of St. Bartholomew's Hospital in the diagnosis of streptococci and staphylococci.²⁰

Method.—Neutral peptone bouillon, to which 1 per cent. of a carbohydrate has been added, is coloured with a little neutral litmus solution, tubed in quantities of 5 c.cm. and sterilized. A broth culture is made from the organism to be examined, and two loopfuls of it are added to a tube of the carbohydrate medium. After incubation at 37° C. the colour of the solution is observed and recorded on the third and seventh days. Glucose, lactose, saccharose, and maltose were the carbohydrates used. Litmus milk and neutral red broth were also used.

The results of these observations are given in Table III, which shows the reactions of the six different strains of bacilli, and also, for comparison, the reactions of the

Fig. 3.—The same colonies under a 3 in. objective.

Klebs-Loeffler bacillus, the *B. xerosis*, Hofmann's bacillus, and Cautley's bacillus. In the case of the xerosis and Hofmann bacilli, the results were those which I obtained from laboratory cultures kindly sent by Dr. Eyre of Guy's Hospital. The results given for the Klebs-Loeffler bacillus and Cautley's bacillus are those recorded by Dr. Gordon.⁴ The behaviour of the various organisms to Gram's stain and Neisser's stain, and their growth on gelatine are also recorded.

TABLE III.

	Gram.	Neisser.	Gelatin.	Glucose.	Lactose.	Saccharose.	Maltose.	Litmus Milk.	Potato.	Neutral Red.
Cases I, 3a ...	+	+	+	3 7	3 7	3 7	3 7	acid	clot	3 7
Case III ...	+	+	+	+	+	+	+	+	+	+
" XV, N _{1a1} ...	+	+	+	+	+	+	+	+	+	+
" " second observation... " " N _{1a1} XY ...	+	+	+	+	+	+	+	+	+	+
" XVII, N ₂ ...	+	+	+	+	+	+	+	+	+	+
" XXIV, N _{2a} ...	+	+	+	+	+	+	+	+	+	+
" XXVI ...	+	+	+	+	+	+	+	+	+	+
*Klebs-Loeffler ...	+	+	+	+	+	+	+	+	+	+
Xerosis ...	+	+	+	+	+	+	+	+	+	+
Hofmann ...	+	+	+	+	+	+	+	+	+	+
*Cautley's bacillus...	+	+	+	+	+	+	+	+	+	+

+ = acid reaction, - = alkaline reaction, o = neutral reaction in the columns referring to carbohydrate media; in other columns + and - signify "positive" or "negative."

* Results recorded by Dr. Gordon.

It will be noted that there is a tendency to acid formation on all four carbohydrate media. It is not at all marked, and this is, I think, an explanation of the variations seen, depending probably upon the degree of vigour of the broth culture used, and also the fact that a loopful may contain very varying quantities of the growth. In the case of diphtheria a very strongly acid reaction occurs in glucose broth (Gordon¹), which is very pronounced on the third day. In none of my cases could the reaction on the third day be described as other than feeble, and it

Fig. 4.—Twenty-four hour culture of *B. septus* on hydrocele agar. (From Case III.) $\times 1,000$ diameters.

often was not observed till some days later. In the case of xerosis and Hofmann bacilli, there was no doubt of the alkaline reaction throughout—although abundant growth took place in the tubes—visible to the naked eye. I hope that these reactions will be of service in the differential diagnosis of the four organisms in question.

Fig. 5.—Third day culture of *B. septus* on nasagar. (From Case XXIV.) $\times 1,000$ diameters.

Staining Reactions.

The bacillus stains well with all aniline dyes, and by Gram's method. Neisser's stain is negative. No granules were observed in any of the cases. This is an important point in the diagnosis of the organism from *B. diphtheriae*.

Microscopic Appearances.

It is a short bacillus which tapers to rounded ends. In early cultures it is so short as to resemble an oval coccus. The average length in a three-day culture is 1.5μ and the breadth 0.3μ to 0.4μ . By the third day a very characteristic appearance is shown. The protoplasm of the ends of the bacillus is deeply stained, leaving an unstained

Fig. 6.—Fifth day culture of *B. septus* on agar. (From Case XVII.) $\times 1,000$ diameters.

band or septum across the middle of the bacillus. With a good illumination the outline of the bacillus can be clearly seen, especially in specimens counterstained with carbol-fuchsin. This appearance has, I think, led to the description of the organism as a diplococcus or a diplobacillus by many observers.

Fig. 7.—Seventh day culture of *B. septus* on agar. (From Case XXIV.) $\times 1,000$ diameters.

The appearance of a pure culture is much more uniform than in the case of diphtheria. There is a tendency to the formation of "cuneiform" figures, and in some cases a palisade arrangement. Wedge-shaped forms occur, and in later cultures a few large involution forms, club-shaped or pear-shaped, but I do not think these are so common as in the case of *B. diphtheriae*.

Pathogenicity.

The constant occurrence of the bacillus in this series of cases, and also in the observations of Cautley,³ Gordon,⁴ and Prosser White,⁵ suggests the probability that it is a factor in the etiology of common colds, and experiments have been made with a view to observing its effects on animals. Dr. Gordon injected a recent broth culture from one of my cases into a guinea-pig, but did not observe any local or general symptoms. Dr. Prosser White's⁵ researches in the same direction are also negative.

In two cases, however, Dr. Gordon noted symptoms of slight illness in guinea-pigs after injection with Cautley's bacillus, but they recovered. It must be remembered that the symptoms of a common cold in the human being are slight. The absence of a licence for inoculation experiments at the Stephen Ralli Memorial unfortunately prevents me from entering upon a full investigation of this point.

Nomenclature.

The pathogenicity of the bacillus has not been clearly established, and the name *B. coryzae segmentosus*³ seems therefore a little premature. I would suggest the use of the term *B. septus* (Latin *sepio*), which describes its main

characteristic, but does not commit us to a theory as to its pathological effects.

THE MICROCOCCUS CATARRHALIS.

Gram negative cocci were observed in ten out of the twenty-one cases—that is, 48 per cent. These had the characteristics of the *Micrococcus catarrhalis* as described by Gordon.¹¹ In the two cases in which a pure culture was obtained I passed the organism through the carbohydrate media, the results agreeing with those given by Dr. Gordon,¹¹ and also with the reactions given by a laboratory culture which he kindly sent me; these results are shown in Table IV.

TABLE IV.

	Gram.	Glucose.		Lactose.		Saccharose.		Maltose.		Litmus Milk.		Potato.
		3	7	3	7	3	7	3	7	acid	clot	
Case XV, T ₁ a ₁	±	—	—	—	—	—	—	—	—	—	—	—
„ XVI, N ₁ a ₁₁	—	—	—	—	—	—	—	—	—	—	—	+
Dr. Gordon's specimen	—	—	—	—	—	—	—	—	—	—	—	—

Dr. Gordon states that these reactions are sufficient to differentiate the *M. catarrhalis* from all other cocci. It is a somewhat large coccus. It grows rather more slowly than the diphtheroid bacilli, and its growth on ordinary media is uncertain. On nasgar it gives in two or three days a vigorous growth consisting of well defined, discrete, round colonies, yellowish-white in colour. Under a low power of the microscope the edges of the colonies are seen to be even and well-defined, and not thinned at the periphery. On gelatine at 22° C. I obtained a fairly good growth in one case, but in the other and in the laboratory culture it failed to grow. On ordinary agar at 37° C. it was sometimes possible to obtain a growth, when inoculated from a pure culture, but if mixed with more vigorous organisms, such as staphylococci or diphtheroids, it is usually overgrown by them. Hence the need for a medium such as nasgar, which encourages its growth.

Fig. 8 shows the microscopic appearance of a three-day culture of *M. catarrhalis*.

Fig. 8.—*Micrococcus catarrhalis*, stained carbol-fuchsin. × 1,000 diameters.

CONCLUSIONS.

1. Both diphtheroid bacilli and the *Micrococcus catarrhalis* were present in my series of cases, but Pfeiffer's bacillus was present only in such small numbers as to be negligible.

2. Other organisms were present in much the same proportion as in normal throats and noses.

3. The diphtheroid organism present conformed to the description given by Cautley³ of the bacillus discovered by him in 7 out of 8 cases of common cold, and confirmed by Gordon⁴ and Prosser White.⁵

4. The diphtheroid bacillus isolated gave reactions in carbohydrate media which serve to differentiate it from diphtheria on the one hand and xerosis and Hofmann on the other.

5. The question of the exact symptoms, if any, caused by the diphtheroid bacillus and the *Micrococcus catarrhalis* respectively cannot be said to be settled. In view of the fact that nasal discharge was not a prominent feature of my series of cases, it seems likely that the diphtheroid organisms are rather a cause of a painful sore throat, with headache, malaise, and muscular pains, irritable cough,

and scanty viscid expectoration. Whether they cause coryza—a cold in the head—is at least open to question, especially in view of the presence of *M. catarrhalis* in nearly half my cases.

6. It seems therefore best to give a name such as *Bacillus septus*, which does not assume a knowledge of the pathological significance of the organism, or to refer to it as "Cautley's bacillus."

7. Its occurrence in as many as 95 per cent. of cases nevertheless makes it almost certain that it is of importance in the etiology of a common cold.

I hope to carry out further investigations on this subject, and trust that it will receive both from bacteriologists and clinicians more attention than in the past. In view of the recent work on diphtheroid organisms in general paralysis of the insane, I cannot help feeling that we are on the eve of a great advance in our knowledge of the pathology of some obscure diseases. Possibly even the common cold, neglected and despised, may be found to have a place in the etiology of some serious diseases, hitherto unexplained.

[P.S.—I should like to thank Mr. Edmund Spitta (joint author of Slater and Spitta's *Atlas of Bacteriology*) for his kindness in taking the beautiful high power photomicrographs which illustrate this paper, Figs. 4, 5, 6, 7, and 8.]

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THE DIFFUSION OF RED BLOOD CORPUSCLES THROUGH SOLID NUTRIENT AGAR.

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WHEN blood is planted on the surface of some solid agar in a tube a remarkable diffusion of the red corpuscles takes place under certain conditions, appearing as an opaque cloud descending from the drop of blood placed originally in the tube. This diffusion appeared to me so interesting that I was led to investigate it further; to make a series of experiments in the endeavour to elucidate the conditions under which it takes place, and to record some measurements under the different circumstances.

If an ordinary sterile tube of nutrient agar is taken and a drop of blood is placed on the surface of the slope, coagulation will occur in the usual way, and the drop will remain clearly defined, showing bright red against the yellow tinge of the medium. Provided the surface of the agar has not been injured by the platinum loop or other instrument used for inoculating the tube the blood will remain on the surface, and will not soak in at ordinary temperatures, no matter how long the tube is kept. When the blood has coagulated the tube may be inverted or placed in any position without the blood running, as the clot adheres to the smooth surface of the agar.

CONDITIONS UNDER WHICH THE RED CORPUSCLES ARE DIFFUSED.

If a tube containing the sloped agar with a drop of blood implanted on it be incubated at 42° C. a curious change takes place. This begins to make its appearance in about twelve hours. The original drop of blood on the surface looks just the same; but it will appear as if some of the blood was extending downwards from it into the substance of the medium, a red cloud, thick and opaque, spreading in a semicircle from the drop and getting