Those due to the streptococcus of Fehleisen were:

Impetigo contagiosa and its varieties, including ecthyma, but excluding Bockhardt's impetigo.

Erysipelas.

Erysipeloid.

Superficial whitlows.

There were also pustular inflammations due to pyogenic organisms such as those of trichophyton megalosporon, the tubercle bacillus, blastomyces, etc. A mixed infection of pus cocci might occur, streptococcus impetigo being invaded and modified by the staphylococcus aureus.

Bockhardt's impetigo was a frequent precursor and concomitant of boils, and it should be promptly treated as a prophylactic measure against them. An untreated streptococcus impetigo led to a rapidly spreading erysipelas in an infant, and endangered the child's life. In the treatment of boils and carbuncles the aim should be the local destruction of the pus cocci as early as possible, and therefore an early incision and disinfecting the cavity with carbolic acid solution before the pus cocci had travelled along the lymphatics and set up a fresh boil some distance off.

In pemphigus neonatorum the bullae had perfectly clear contents, and both the staphylococcus and the streptococcus had been found by different observers, the staphylococcus being the most frequent. It was generally a sign of unhygienic surroundings, but unless neglected, or derived from puerperal fever in the mother, it was readily amenable to treatment. Under modern asepticism it was now never seen in lying-in institutions where formerly it was endemic.

Fungating papillary growths were apt to form on all chronic suppurating surfaces and after some acute suppurations less generally recognized conditions dependent on pus organisms occurred. They were all pyogenic granulomas with different names according to the underlying diseases on which they developed, they might be tuberculous, syphilitic, and in the axillae and groins form part of the symptomatology of pemphigus vegetans. The so-called botryomycosis hominis was an example of a fungating granuloma after acute suppuration. Hypertrophic scars also were probably avoidable by excluding pus organisms during the healing process of an open wound.

This diversity of lesion from the same organisms was largely due to the mode and depth of implantation in the skin, of the pus cocci and showed how far we had advanced on Willan's classification according to the primary lesion.

DERMATITIS AND SEBORRHOEA.

The modifications of dermatitis produced on a seborrhoeic basis or the seborrhoeides were then discussed, and it was pointed out that seborrhoea oleosa was now again regarded as excess of secretion from the sebaceous glands, and not from the sweat glands as Unna advocated, and that Sabouraud ascribed it to a special micro-bacillus, the comedo also being due to the same bacillus. While the former fatty incrustation so common on the scalp was no longer regarded as a true seborrhoea, but a cell proliferation chiefly of the horny layer, due it was said to be the bottle bacillus and the seborrhoeic micro-bacillus in combination, the secondary invasion of the staphylococcus aureus and a grey coccus produced, if Sabouraud was correct, the various seborrhoeides. That is to say, the apparently trivial seborrhoea afforded a favourable breeding ground for other more actively mischievous organisms. An example was given of the active dermatitis which might suddenly spring up under mental emotion on a scalp on which this fatty pityriasis had been present for years without any symptoms beyond general thinning of the hair.

The seborrhoeides were described as imitators of different forms of eczema, lichen, and psoriasis, and other inflammations, and it was added that Sabouraud ascribed to mixed infections of the pus and seborrhoeic organisms the production of the pustular eruptions—acne varioliformis, acne furunculosa, chronic furunculosis of the neck, sycosis, acne keloid, and dermatitis papillaris capillitii. If these views of mixed infection were confirmed, and they were highly probable; it was an important generalization which ought to lead to improved conceptions both of the pathology and treatment of many forms of dermatitis.

LOCAL ORIGIN OF GENERAL ERUPTIONS.

The lecturer then passed on to the consideration of the local origin of many general and symmetrical eruptions, and showed that while it was first pointed out by Brocq in relation to the somewhat acute disease called pityriasis rosea, it was capable of extension to other diseases, such as psoriasis

and lichen planus, in their primary attacks. In pityriasis rosea there first appeared a single patch, generally in some part of the trunk, which slowly enlarged peripherally for eight or ten days, and then a widespread symmetrical outbreak occurred which might in a few days cover the whole body and upper segments of the limbs, the lower segments seldom being much involved, and after lasting three or four weeks the eruption gradually disappeared. In less typical cases the development might be slower, might stop more or less short of generalization, and the tendency to spontaneous involution be much less, so that sometimes cases lasted for several months.

In first attacks of psoriasis, the lecturer had frequently been able to trace the same mode of development, though, owing to the slower course of the disease, it was less obvious than in pityriasis rosea. For weeks, months, and occasionally even years, there might be only one or two patches, then they began to multiply: if slowly, perhaps on the same limb only, and not very far from the original patch or patches, but either with or without the local extension, generalization eventually took place, and in recurrences this sequela of events could no longer be traced. In lichen planus development from a single focus could not often be proved, but it was common for a few foci of the chronic form of the disease to be present for months or even years, and then suddenly for a generalization of the more acute miliary form to occur sometimes from a traceable and sometimes without a traceable exciting cause.

The most feasible explanation was that there was first an invasion of a microparasite from without, and that this underwent local multiplication, or perhaps a toxin was formed, and then internal absorption into the circulation and generalization from within outwards.

The moral was that every effort should be made both to get rid as soon as possible of the beginnings of disease, and that in a recurrent disease like psoriasis it was not sufficient to remove the bulk of the eruption, but efforts should be made to clear up every remnant of it.

THE BACTERIOSCOPIC DIAGNOSIS OF SEWAGE POLLUTION OF SHELLFISH.

By E. KLEIN, M.D., F.R.S.,

Lecturer on Bacteriology, St. Bartholomew's College, London.

It appears from various published accounts that those who have worked at the bacteriology of shellfish are disinclined to attach any precise significance to the occurrence in them of certain microbes which come under the term of bacillus coli and coli-like bacteria. It is therefore with the object of inviting reconsideration of the subject with a view to obtaining unanimity in the matter of a standard for diagnosis, that I offer here the following remarks. After a considerable experience, I have arrived at the conclusion that, due consideration being given to all the facts as to the conditions of the precise locality whence shellfish have been derived, the presence in greater or less amount in such shellfish of certain bacteria affords a trustworthy indication as to whether or not such shellfish have been recently exposed to undesirable fouling (sewage pollution).

It is an important question—important from the public-health point of view—whether, in the event of a small amount only of fouling being demonstrable, such shellfish are to be rejected as unfit for consumption. It will be admitted, I think, that oysters which are laid down in a locality to which sewage discharged at a distant point into the tideway has access in very small amounts only and occasionally stand in a different position—*qua* possible disease production—from oysters which are practically continuously exposed to, at times are actually flooded by, crude sewage discharged in their immediate neighbourhood; and, further, it is obvious that there is an important distinction to be made between the latter and other oysters which are miles removed from a sewer outfall, but which, owing to being laid down in a shallow part of a bay, may still be, and at intervals only are, brought into contact with matters that have long before, perhaps many days previously, been discharged from sewage outfalls. This last category of oysters could only in a very remote degree be considered as potential disease producers.

Oysters, moreover, stand in a different position from cockles; for, whereas the former when they have inhibited the *B. typhosus* soon (after ten to fourteen days) discard it again when placed

in clean sea water, the latter (cockles) retain this microbe, and, as I have shown (*Report of the Local Government Board, 1900-1, p. 570*), are capable even of becoming a nidus for its multiplication.

By estimating, having due regard to the above considerations, the relative proportion between the number of shellfish yielding positive as compared with those yielding negative results on bacterioscopic examination, I consider, from a large experience, that it is possible to diagnose approximately the percentage value of probable sewage pollution in a given instance. To this end, and in a positive sense, the presence of *B. coli communis*, or the typical *B. coli*, together with the spores of *B. (enteritidis) sporogenes* is all-important. Latterly, in addition, the presence of streptococci (Houston) which stain by the Gram method have been found to afford valuable confirmatory evidence.

THE COLON GROUP.

B. coli communis or the typical *B. coli*, as is well known, belongs to a tribe of bacteria comprising many and different species and their varieties; indeed, with increase in the number of workers and with multiplication of methods, the members of the great tribe of coli bacilli become more numerously recognized and identified. All coli bacilli and coli-like bacilli have certain characters in common. But there are other characters by which they differ from one another in a more or less definite manner.

All coli bacilli and coli-like bacilli, including the typhoid bacilli, have the following characters in common:¹ (a) They grow well on gelatine at ordinary temperature, although they grow, of course, better at 37° C.; (b) they cause, when growing in broth culture at 37° C., in twenty-four hours uniform turbidity due to their rapid multiplication; (c) they are capable of growing in broth, gelatine, or agar to which 0.05 per cent. phenol had been added; (d) they are capable of growing in the depth of the culture media (are in effect facultative anaerobes), although their growth on the surface—that is, exposed to oxygen of the air—is quicker and more copious; (e) they do not at any time liquefy gelatine—namely, do not peptonize gelatine. [This latter character—namely, not liquefying the gelatine—is of importance, since there have become known certain microbes which in morphological and some cultural characters resemble the coli bacilli in a marked degree, but which on continued observation, owing to their more or less slow liquefaction of the gelatine can with certainty be distinguished from them];² (f) growing on the surface of gelatine their young colonies are flat, dry-looking, more or less translucent expansions which can be best compared with a vine leaf, that is, a prominent excentric or sometimes central thickened part and a filmy crenate irregular peripheral portion; (g) in streak culture on gelatine they form a rapidly-expanding, flat, dry, more or less translucent band with irregular crenate margin; (h) under the microscope they are cylindrical rods, showing more or less pronounced motility; they do not stain by the Gram method.

In some species the motility is great, and is observed on most individuals in the hanging-drop preparation, in other species only few individuals show this motility; but in all cases the motility is observed only in the microbes of recent or fairly recent cultures in broth, on gelatine or agar; and (i) when stained by suitable methods it can be shown that they possess flagella—instruments of their motility—and in this respect there exist very great differences amongst the different groups and even amongst the different species. Thus while some have few flagella attached to their ends, others have numerous flagella distributed over the whole surface of the bacilli; and while in some species the flagella are, comparatively speaking, thick, coarse, and slightly wavy, in others they are thin, long, and spiral.

These are the characters which may be said to belong to all the known species of coli bacilli and coli-like bacilli, including the typhoid bacilli, and it must be obvious that if the examination of a particular microbe under investigation does not extend beyond ascertaining the above characters in part or as a whole, the identification of the species or variety to which the microbe in question belongs cannot safely be made. This is a point which too often is lost sight of, and accordingly some serious mistakes are liable to be committed.

I shall show presently, as regards coli-like bacilli, that a

¹ It will be understood that the account here given is a summary of the results of investigations by many observers.

² In the oyster this kind of liquefying "coli-like" microbe is occasionally met with.

good many more characters have to be ascertained before any definite opinion as to exact species can be offered, but I will here anticipate by stating that so far as our present knowledge goes—and it unfortunately does not go very far as yet—we can do no more than assert that there exist certain groups which are fairly well separated from one another, and similarly we are constrained to admit that between some of the well-defined species within the groups there are others which, whether they be called varieties or species, must be considered intermediary or transitional. In illustration I would note that most bacteriologists who have devoted particular attention to this subject are agreed that three³ groups of these bacilli stand out fairly well, having fairly well defined boundaries, although each group may, and does, contain several species or varieties. The three groups in question are (1) the group of *B. coli communis*, (2) the group of *B. (enteritidis) Gaertner*, and (3) the group of *B. typhosus*.

1.—*Bacillus Coli Communis*.

Bacillus coli communis, or the typical *B. coli*,⁴ belongs to a group which possesses, besides the above general features, the following additional characters:

(a) It ferments—that is, forms rapidly acid and gas in glucose, as well as in lactose. A very useful mode of glucose culture is the one first introduced by Dr. MacConkey—namely, litmus, glucose, taurocholate of soda, peptone, and water. Inside the fluid is a fermentation tube—that is, an inverted small test tube—so as to indicate the presence of gas, if any, during incubation. But while this MacConkey tube is very useful, it is not a short cut to success any more than any other more or less reputed material or method. If *B. coli communis* be introduced into a MacConkey tube, and this be incubated at 37° C. for twenty-four hours, it will be found strongly acid, that is red, and showing copious gas, while the inner small inverted tube will be lifted out a long way above the level of the fluid owing to the presence of copious gas. But this condition, although suggestive, is no proof (does not suffice to indicate) that the change is necessarily due to *B. coli communis* or to excremental pollution, because bacteria may produce the same change—that is, acid and gas—bacteria, for instance, not necessarily connected with sewage. Another culture tube containing litmus, lactose, peptone water with a small inverted tube inside the fluid may afford important corroborative testimony. If both the MacConkey tube and this other litmus lactose peptone tube show after twenty-four hours' incubation at 37° C. strong acid production and copious gas, it may be taken almost for certain that there is present *B. coli communis*, or some coli bacillus very nearly allied. I said advisedly "almost," because in some few instances the microbe which produced the above change was upon further test found after all not to be the typical *B. coli*. In the majority of instances, however, the preliminary diagnosis will on further test cultures be found correct. As stated just now, if a positive result in the MacConkey tube as well as in the lactose peptone tube is evident already in twenty-four hours at 37° C. incubation, there is afforded presumptive evidence of the presence of gas-forming coli-like bacteria, although not necessarily *B. coli communis*, and for this reason subcultures are essential.

(b) The *B. coli communis* usually curdles milk at 37° C. in twenty-four to forty-eight hours.

(c) It forms indol in broth culture incubated at 37° C. for three to four days.

(d) It bubbles, that is, forms numerous gas bubbles in shake culture in beef broth peptone gelatine with or without special addition of glucose.

(e) It gives positive result when cultivated in broth to which neutral red has been added, namely, causing in twenty-four to forty-eight hours incubation at 37° C. distinct change of the original red into fluorescent green.

(f) It possesses a limited number of flagella, two, three, or more often attached endwise, the flagella being relatively coarse and a little wavy.

(g) On steamed potato *B. coli communis* forms a moist, more or less brownish growth.

While these are special characters of the *B. coli communis* group, there are differences between different varieties of this

³ I do not mean that these three groups exhaust the whole tribe, but only that we have better knowledge of them than of others; for example, of the group of *B. lactis aerogenes*, of the group that cause haemorrhagic septicaemia, etc.

⁴ In my papers in the *Report of the Medical Officer of the Local Government Board, 1892-3*, and also in that on *Oyster Culture and Disease, 1894-5*, pp. 110 and 111, I have carefully noted the characters of this microbe, as also of the *B. typhosus*.

group, for instance, as regards some of those varieties the colonies are less translucent than others; in some the bacilli are more cylindrical than in others, of course cultivated under precisely the same conditions; and in some the bacilli are distinctly more motile in the hanging drop than in others, and the flagella in one variety more numerous than in another; further, one variety forms indol more distinctly and more quickly than in another.

A considerable experience enables me to state that if the following tests are positive: Glucose as well as lactose (red and full of gas in 24 hours); shake gelatine (ordinary beef broth gelatine full of gas bubbles in 24 hours); litmus milk (red and curdled in 24 to 48 hours); neutral red positive; indol formed in broth culture, there is every probability that the observer is dealing with the true *B. coli communis*.

II.—*The Bacillus (Enteritidis) Gaertner.*

This group comprises coli-like bacilli with the following special characters which separate it from the group of *B. coli communis*: (a) It ferments glucose but does not ferment lactose; (b) after a short acid stage it forms alkali distinctly in litmus milk, the medium turns slate colour after several days' incubation at 37° C., while the milk remains fluid; (c) it does not form indol in broth; (d) it forms a translucent colourless growth on steamed potato; (e) it is more motile than *B. coli communis* in the hanging drop and possesses numerous thin spiral flagella distributed over the whole surface of the bacilli, like those of the typhoid bacilli (see below). It, like *B. coli communis*, bubbles gelatine in shake culture and gives positive neutral red test.

III.—*The Bacillus Typhosus.*

This is the microbe of typhoid fever and the best known representative of this group. It possesses the following characters: (a) It is very motile, and in recent cultures (gelatine) very cylindrical, many forms thread-like; it grows slower than the two former on gelatine, and forms thereon a more translucent growth; (b) it forms a colourless translucent film on potato; (c) it forms acid slowly; (d) it does not curdle milk and does not produce indol; (e) it does not ferment glucose or lactose; (f) it does not bubble either ordinary gelatine or glucose gelatine; (g) it does not give the neutral red test; (h) it possesses numerous flagella, thin, long, and spiral, distributed over its surface; (i) the bacilli of an emulsion are distinctly agglutinated (clumped) by the blood of a typhoid-immunized animal in higher dilutions than any members of the other two groups.

There are several additional means by which the three groups can be distinguished, but these means are less reliable and are not essential—for example, growth in Proskauer and Capaldi's medium, growth in litmus glucose agar plates (Horrocks), in litmus lactose phenol agar plates (Chante-messe), in Elsner's potato gelatine, in Weyl's medium, and others.

As with the first group, namely, that of *B. coli communis*, so with the Gaertner and the typhoid group varieties or strains are comprised within them which differ from one another slightly, both in morphological respects (some are more cylindrical than others, some have more flagella than others), and in action on rodents when inoculated into them, some being more virulent than others.

Other Bacilli of the Colon Group.

These three groups, as already mentioned, do not by any means exhaust the list of observed coli bacilli. Some aberrant forms approach more to one of these groups than to another; in fact, every one who has experience in the matter knows that in the various animal tissues and the most various other materials which are assumed to be directly or indirectly polluted, or at any rate are open to be polluted, with filth of all kinds, microbes are met with which must needs be referred to the tribe of *B. coli*. But it is extremely difficult to judge, and is only possible to do so after prolonged examination, whether they belong to the group of *B. coli communis* or to that of *B. Gaertner* or to some other group, some partaking of certain, but not all, the characters distinctive of *B. coli communis*, others again partaking of some, but not all, the distinctive characters of *B. Gaertner*, or again of *B. typhosus*. Some are poisonous and virulent when introduced into rodents, while others are not.

This seems to explain why it would be unjustifiable to draw any conclusion as to the exact derivation of any material from the presence in it of such insufficiently defined coli-like microbes. These being present in many substances in Nature,

their exact habitat not being defined, and it not being sufficiently known whether, and to what extent, they bear relation to filth, cannot at present be used for diagnostic purposes in the same sense as *B. coli communis*.

Conclusions.

The detection, therefore, of the presence of coli-like bacilli bearing no near resemblance to *B. coli communis* does not permit any definite expression of opinion as to the probable or even possible derivation from sewage, or as to probable pollution with filth, of the material from which such microbe has been isolated. It is different, however, with the microbe above referred to in detail as *B. coli communis*—that is, the typical *B. coli*. As to this micro-organism, it is known for certain that its common habitat is the bowels of man and of the higher animals, and that domestic sewage and excremental matter and everything directly or indirectly polluted with these matters contains the *B. coli communis*—that is, the typical *B. coli*. In domestic sewage this microbe is present to the extent of 100,000 to 800,000 per 1 c.cm. of the sewage, and Dr. Houston and myself have shown that sewage added to sterile water in such small quantities as to defy chemical analysis is readily detected by the bacterioscopic test—namely, the detection of *B. coli communis*.

To summarize, then, the foregoing, the following propositions hold good:

1. The circumstance that a microbe shows the characters common to all groups of the coli tribe does not suffice to identify it for useful purposes. For proof that it is *B. coli communis*, or that it belongs to the group of *B. Gaertner* or *B. typhosus* group, it has to comply with the several tests agreed by all observers as characteristic of one or other of these groups.

2. The fact that a microbe owing to insufficient response to certain presented tests, can only be described as a coli-like microbe, is at present of indeterminate value in making a definite diagnosis of sewage or other pollution.

3. *B. coli communis* is a microbe which has its habitat in bowel discharges, that is, excremental matters, and is contained therein in enormous numbers; its presence, therefore, in any material in appreciable and relatively large amounts is highly suggestive of sewage and excremental pollution.

THE COLON GROUP IN RELATION TO SHELLFISH.

Passing now to the examination of shellfish—namely, cockles, mussels, and oysters—the question of the greatest importance to the bacteriologist is, Do these animals contain normally *B. coli communis*? In my report, to the Medical Officer of the Local Government Board, 1894-5, I have shown that many oysters are free from *B. coli communis*, and that oysters retained in localities polluted with sewage are liable to contain the typical *B. coli*, that is, the *B. coli communis*. Professors Herdman and Boyce⁵ have shown by their examinations that except in two out of a large number of shellfish (19 batches of oysters, 18 batches of cockles, and 18 batches of mussels) the *B. coli communis* was found absent.

Analysing their Tables II, III and IV (p. 48 and 49) which give a summary of the results of the analyses of shellfish by them, it will be seen that with the exception of oyster 32 and oyster 36 (Table II, p. 48) which might have contained the *B. coli communis*—the tests employed were insufficient to afford a positive diagnosis—none of the oysters (19 batches) showed the *B. coli communis*; nor (Table III, p. 49) did any of the 18 batches of mussels; nor (Table IV) did any of the 18 batches of cockles contain the *B. coli communis*, as indeed must be obvious to any one who knows what the reactions of *B. coli communis* are. Professor Boyce in subsequent reports on the analysis of shellfish for the Corporation of Liverpool, mentions in a general way the frequent presence in the shellfish bought in Liverpool shops, of *B. coli*, but not giving the details of the examination it is not possible to draw any conclusion as to the kind of *B. coli*.

Recently I have again had further opportunity of analysing a considerable number of various kinds of oysters and as a result I am in a position to affirm:

1. That the *B. coli communis*, or the typical *B. coli*, is not a natural inhabitant of these shellfish. Fifty-six oysters examined in one week, 24 in another, 20 in a third, 22 in a fourth week, and five batches of ten oysters each in a fifth week—some derived from deep-sea layings, others from layings to which practically no sewage has access—failed to show the presence of *B. coli communis*, although as much as

⁵ Thompson-Yates's Laboratory Report, vol. ii.

$\frac{1}{2}$ c.cm. of the juice and liquor of the interior of each oyster was subjected to the special analysis.

2. The nearer to sewage outfalls, that is, the more exposed oysters and cockles are to sewage pollution, the greater the percentage of these shellfish polluted with *B. coli communis*.

3. The further away from sewage outfalls, or the smaller the amount of sewage accessible to the oysters or cockles, the smaller the number of these shellfish that are found to contain in the interior of their shells the *B. coli communis*.

Method of Examination.

The analysis of cockles and oysters for the purpose of detecting the presence of *B. coli communis* was carried out by me in the following manner: Of each batch of cockles, 12 to 24 individuals were examined, and of each batch or sample of oysters, 10, 12, and sometimes 16 or 18 individuals. In all cases the shell of the fresh and living mollusc was thoroughly brushed with a clean brush under the running tap; then it was dried with clean cloth, opened with sterile instrument, and with the juice and liquor within the shell, cultures were established. Of each of six or eight oysters, about $\frac{1}{2}$ c.cm.^o of this liquor was added to one MacConkey tube and the same amount to one lactose tube; of further two, sometimes four, oysters, $\frac{1}{2}$ c.cm. of this liquor was added to each of two, or in some cases four, phenol broth tubes, or in lieu (in the earlier analyses) about three big drops of the juice of each of two animals to establish two litmus glucose agar surface plates. Next day, that is, after twenty-four hours' incubation at 37° C., the necessary subcultures were made from the original tubes and plates in order to demonstrate the presence of *B. coli communis*; streak and shake gelatine cultures, MacConkey and lactose peptone tubes, litmus milk, ordinary broth (with and without neutral red), litmus, lactose phenol agar plates, etc. From the turbid phenol broth also microscopic specimens stained by Gram method were made in order to detect the streptococci. Cultures on solid media may also be employed for their detection.

BACILLUS ENTERITIDIS SPOROGENES.

Investigation of shellfish in the above sense has not been limited to the demonstration of *B. coli communis*. Examination has sought also the demonstration of the spores of *B. enteritidis sporogenes*. Spores of this bacillus are constantly present in domestic sewage to the number (as shown by Dr. Houston and myself) of from between 100 to 2,000 per 1 c.cm. These spores, as I have repeatedly shown, are present also in manure (consequently in street dust), and in all substances exposed to pollution with filth, manure, sewage, etc.

The presence, therefore, in shellfish of the spores of *B. enteritidis sporogenes* as well as *B. coli communis* may serve as an additional indication of possibly recent sewage pollution; at least, it is tolerably certain that oysters and cockles not laid down in sewage-polluted waters are free from the spores of this anaërobe, and also that the further away from definite sewage pollution the smaller the number of these shellfish which contain these spores.

Since the spores of *B. (enteritidis) sporogenes* are, in sewage, greatly inferior in numbers to the *B. coli communis*, it is necessary to use a larger quantity (0.5 c.cm.) of the shellfish material (juice and liquor) for each anaërobic milk-culture tube if that anaërobe (*B. enteritidis sporogenes*) is to be demonstrated. Although, as I have repeatedly described, the milk culture may be typically changed by the twenty-four to thirty-six hours' growth of the above anaërobe, it does not follow that the so changed milk culture must be that of the *B. (enteritidis) sporogenes*; and in this connexion I cannot do better than illustrate by a reference to the already quoted papers by Professors Herdman and Boyce, that even experienced observers are liable to mistake some other anaërobe for the *B. (enteritidis) sporogenes*. On p. 55 (loc. cit.) these observers state among their conclusions:

17. We have shown the frequent presence, in various shellfish, of anaërobic spore-bearing bacilli, showing the characteristics of the *B. enteritidis sporogenes* recently described by Klein.

Now, examining the evidence on which this conclusion is based (see the table on p. 51), it is found that the authors have had before them the real virulent *B. enteritidis sporogenes* in cockle 1, and possibly also in oyster 4. But that in all other shellfish examined by them (10 oysters, 6 mussels, 3 cockles, 1 periwinkle) the resulting growth was decidedly not that of *B. enteritidis sporogenes* (Klein), and for the sufficient reason that this latter microbe *does not at any time*

form spores in milk culture. The authors referred to, be it noted, describe the microbes cultivated by them in the milk cultures as either short or large spore-bearing bacilli.

It is quite clear, therefore, from Professors Herdman and Boyce's table that with the exception of 1, or at most 2, shellfish out of the 22 bought by them indiscriminately in town shops, the shellfish examined by them did not contain the *B. (enteritidis) sporogenes*. This is quite in agreement with what I find from my own recent investigations: out of 56 oysters analysed within a week, 1 only contained the spores of this anaërobe. But out of other 8 oysters coming from a distinctly sewage-polluted laying, 4 contained these spores. Again, in a batch of 12 oysters coming from a laying in deep water far out from the shore, not a single one contained the microbe, whereas 4 out of 10 in one batch, 5 out of 20 in another batch of oysters of the same locality, but laid comparatively near the sewer outfalls, contained the spores of *B. (enteritidis) sporogenes*, using always of each oyster 0.5 c.cm. for a culture tube.

It must, however, be obvious that the presence of the spores of *B. (enteritidis) sporogenes* alone—that is, without the simultaneous presence of *B. coli communis*—cannot be held sufficient proof that the oysters or cockles have been subjected to recent sewage pollution. For the spores of *B. (enteritidis) sporogenes* being, like other spores, highly resistant, may have found their way to the locality in which the shellfish had been kept any time (long or short) previous. But found together with *B. coli communis* (and with streptococci) in oysters, the spores very probably had arrived in the locality recently, and in direct association with sewage and excremental matters.

A NOTE ON BOSSI'S DILATOR IN ECLAMPSIA.

By J. W. BALLANTYNE, M.D., F.R.C.P.E., F.R.S. EDIN.,

Lecturer on Midwifery and Diseases of Women, Medical College for Women, Edinburgh; Examiner in Midwifery in the University of Edinburgh.

THE management of cases of eclampsia in labour is still so unsatisfactory that obstetricians are glad to welcome and test any new plan of treatment which may seem to promise success. The rapid dilatation of the cervix uteri with Bossi's four-bladed dilator and the early termination of the labour by forceps or naturally is perhaps the newest method of management which has been placed before the profession. I have now dealt with three cases of albuminuria in pregnancy, two of which went on to eclampsia, by this method, and I place the results on record in the hope that others who have experience in this direction may be induced to do so also.

1. My first case was that of a primipara, aged 23, who was admitted to the Edinburgh Royal Maternity Hospital on the evening of November 13th, 1902. She had had three convulsions before coming in, there had been marked vertex headache for two days previously, and the os uteri was about 1 in. in diameter. The position was R. O. P. and the anterior fontanelle was felt presenting. She had a bad convulsion just after being brought into hospital. The pelvis was somewhat narrow, and there was a large amount of albumen in the urine (24 grams per litre). I inserted the Bossi dilator at 10 p.m., and obtained full dilatation of the os in twenty minutes. I then applied forceps, but could not get rotation of the head. There was evidence that the child was dead, so I performed basilysis and rapidly extracted. The child weighed 7 lb. without the brain and cranial vault bones. The mother made a slow but complete recovery. There was no laceration of the cervix. The diagonal conjugate was just over 4 in.

2. My second patient was a 4-para, 32 years of age, who was admitted to the Maternity Hospital on January 3rd, 1903, having been forty hours in strong labour in the first stage. She was given three successive hypodermic injections of morphine in the hope of suspending the uterine action and allowing the patient to get some sleep and rest, but after 1½ gr. had thus been given without any result, and as it was now discovered that there was albuminuria, I decided to dilate the cervix with the Bossi dilator. She had by this time been fifty hours in strong labour, and the os which was about 2 in. in diameter had been of the same size for many hours. The presentation was the vertex, the position R.O.P. In half an hour, with the help of the Bossi dilator, I completed the dilatation of the cervix, put on forceps, and delivered a living male infant weighing 7 lb. 7 oz. Both the mother and child made good recoveries.

^o In the case of cockles a lesser quantity is used, because there is not sufficient in many of them to supply the required number of tubes.