cised in this respect on our behalf. It may be that those who preside over the Councils of this Association, are not satisfied that enough has been accomplished in the name of otology to warrant its elevation to the status of a full Section. But whatever motive may have dictated the policy complained of, I am compelled to believe that the fault was due to ignorance of the extent and character of the labours in which we are engaged, rather than to the intention of depreciating those labours.

While, therefore, we will be thankful for the smaller mercy accorded us, we may rest assured that the time has passed in which it would be possible to repeat an occurrence which happened at the beginning of the present decade. At the time to which I allude, a gentleman became a candidate for the post of aural surgeon to one of the large London hospitals. A friend solicited the support of a senior member of the hospital staff in his interest, and received for answer: "Oh, yes; I daresay he will do very well to look into that little hole!"—meaning the external meatus.

But, gentlemen, we have emerged from the era of depreciation, and may take consolation for the past in the contemplation of the record which can justly be claimed for otology to-day. For the work of its disciples has made it abundantly clear that, amongst other diseases, many forms of infantile convulsions and meningitis associated with dentition, as also some most rapidly fatal tendencies developed during the course of the exanthemata, owe their gravity to implication of the ear-organ; and that the otherwise fatal results of this complication may be avoided by judicious treatment directed to it. Further, that nearly all forms of vertigo, with its alarming concomitants, are primarily or secondarily aural in their seat, and can only be effectually treated by the recognition of this fact. The intimate anatomical and physiological relations of the nose to the auditory apparatus introduce all the diseases of the nasal organ and its accessory cavities to the aural practitioner. A large proportion of cases of abscess of the brain, and nearly all cases of mastoid disease, as well as many of facial paralysis, originate in the ear. Deafness, the impairment or loss of one special sense, goes without saying. And, lastly, there is that intricate class of symptoms called tinnitus, which is to receive the light of your collective experience in the discussion of to-day. Thus, it would seem that the organ of hearing is one of paramount importance in the economy, whilst rightly to understand its complicated operations in health and disease may well tax the highest faculties of the intellect.

And yet, gentlemen—strange though the anomaly may seem—it is nevertheless true that the examining boards of medicine throughout the country decline to make the subject of ear-disease a compulsory one in the curriculum of the medical student, and except in the most perfunctory way to suggest to him that the ear and its diseases have any particular interest for the medical man or his patients. Surely it is time that this state of things should cease.

It would be contrary to the experience of mundane affairs if the interval to which my remarks have reference did not show some blanks—if we had not to record the disappearance from our midst of some who took honourable position therein. In particular I would remind you that Dr. Cassells, of Glasgow, who at the meeting in Cork in 1879 occupied the chair, has since that time resigned the turmoil of life to enter upon rest. The mention of Dr. Cassells' name will, to those who knew him, revive the recollection of one who was in many respects a man of mark. Paralysed in his lower limbs by a railway accident almost at the outset of his professional career, he devoted the remainder of his life to the practice and advancement of aural work. This he did with a courage and pertinacity that would have been creditable to one endowed with an unimpaired and vigorous constitution. Besides numerous contributions to otology, he just managed to complete the translation of Politzer's large work on the ear, when the pen slipped from his failing fingers, and his shattered frame refused to obey the further mandates of his will. It is meet and fitting that we should on this occasion do honour to the memory of our departed colleague, if only to learn from his example—

That it becomes no man to nurse despair,
But in the face of clenched antagonisms
Worthily to follow up the noblest till he die.

Before resuming my seat, I have yet to discharge the pleasurable duty of welcoming you in the name of our Irish hosts to the cultivated intercourse and refined hospitality of the city of Dublin. Speaking from personal recollection of this aspect of the Cork meeting, I can assure you of a welcome at once hearty and sincere—one which will mark an epoch in the long list of memorable gatherings which it is the happy feature of our Association to provide for the annual delectation of its members.

A FURTHER DESCRIPTION OF THE BACILLUS SCARLATINÆ.

By ALEXANDER EDINGTON, M.B., C.M.,
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SINCE the publication of my previous report (JOURNAL, June 11th, 1887) containing a detailed list of various micro-organisms which had been isolated from the blood and desquamation of scarlatinal patients, I have been asked by several friends for further details of the so-called bacillus scarlatinae. I have been intending to do this sooner or later, but it is more urgently called for now from the fact that the size of the bacillus has been wrongly reported, as no doubt many have seen who have examined the coloured plate and compared it with *B. arborescens*. This bacillus, as seen on cover-glass preparations of freshly-drawn blood, stained with a watery solution of methyl blue, measures from 2μ to 5μ in length and $.4\mu$ to $.5\mu$ in breadth. One does not as a rule find many bacilli, and they have to be carefully looked for; it may even happen that the most careful examination may fail to show them, and yet, if some of the blood be used to inoculate tubes of Koch's jelly in the manner I have previously described, a plentiful cultivation may result. In cases where such cultivation is resorted to, it is advisable to examine the cultivation twenty-four hours after it has been placed in the incubator, when the bacilli, if present, will be found holding themselves for the most part to the upper layers of the liquid. In such original cultivations one is not to expect much of a pellicle at this time, as there will merely be seen a slight film on the surface. If it be blood taken on the third day of the fever, cocci may be present, but not invariably so. As far as I have been able to make out, there are two conditions, namely, where within the first two or three days bacilli are present, and from the fourth to the fifth day there may be nothing at all to be obtained from the blood, cocci, however, appearing later; while in other cases with the bacilli there are cocci also present; whether in these cases the cocci have been present from the period of infection or not I have not been able to make out. If one has obtained after twenty-four hours a cultivation of bacilli and cocci, it is well to make at once a second cultivation, taking care to charge the needle merely from the surface of the liquid jelly, as by so doing one is able to start the second tube with seed material in which bacilli predominate. In this second tube, at the end of twenty-four hours, we shall find a better pellicle, and if this transplanting process be carried on it will be seen that in each successive tube the pellicle is more quickly formed than in its predecessor. If we were to leave the original tube alone for ten days, at the end of that period it would be seen that the bacilli had almost entirely disappeared, but cocci would be present in great numbers. The progressive activity of the bacilli I have alluded to is well seen if one makes plate cultivations from the original cultivation; in such a case it may take nearly a week for the colonies to make their appearance, whereas if a plate be made from a tube in which the pellicle is quicker in forming, the colonies will show themselves in less than twenty-four hours. The bacilli form in jelly much more quickly when incubated than when not so treated. Heat seems to have a marvellous influence on the growth-rate, for plates grown at 16°C . may be comparatively slow; for example, the whole jelly may be liquefied in three or four days, but at 19°C . the same result will be obtained in thirty-six hours. In test-tubes of Koch's jelly, growth is only evinced after the first twenty-four to thirty-six hours as a spreading haze in the line of the needle-track; but in twenty-four hours afterwards, the whole needle-track may be liquefied, the area of liquefied jelly measuring from a quarter to half an inch in diameter at the surface, and usually terminating in a sharp point at the lower part. It must be noted that the rate of growth varies greatly with the activity of the culture, for if one makes a succession of inoculations from tube to tube, it will be noticed that the later generations cause liquefaction much more rapidly than the former. Whether in such cases the pathogenic activity is increased or diminished I am not as yet able precisely to state.

At the bottom of the liquid zone, in tubes grown in the cold, a fluffy sediment may frequently be seen, looking exactly as if a small piece of cotton-wool had been deposited, and if this be examined, it will be found to consist mostly of leptothrix filaments. In tubes of jelly one inch to one inch and a half in diameter incubated, the pellicle is quickly formed, and is peculiarly coherent, the coherency being due, not to any viscosity, but simply to the felting or inter-

Fig. 10.—*Bacillus Scarlatina*, three days growth, at 18° C.

Fig. 8.

Fig. 11.—Micro-photograph of the Edge of a Small Colony of *Bacillus Scarlatina*. A. Central Zone. B. Outer Edge of Growth

Fig. 6.

Fig. 7.

Fig. 9.—Plate Culture of *Bacillus Scarlatina*, twenty-four hours' growth at 18° C.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

lacing of the bacillary filaments. If the pellicle be left to itself for some days, it will get extremely thick and deeply wrinkled, always, however, being extremely dry in appearance; still later a great many minute points of a yellowish-brown tint appear, which, on examination, show multitudes of ovoid spores lying free, while some of the bacilli are found to be relatively thicker than those in the fluid beneath. If grown in a flask of fluid broth, the pellicle is beautifully seen and invariably tends to grow at its periphery out of the fluid, and may reach half an inch up the sides of the flask. It is further to be noted that the growth of the bacilli in jelly is unattended with any opacity in the medium, although the upper layers of the jelly immediately beneath the growing pellicle may show a slightly greenish yellow tinge, but this is extremely slight. In tubes a month or more old, in which the jelly is completely liquefied, the fluid is beautifully clear and limpid, and the pellicle at first formed, and later precipitated, will be found to have almost entirely disappeared. If the bacillus be grown in milk and incubated, a beautiful pellicle forms, and coincident with this will be noticed a gradual precipitation of the casein, but which, nevertheless, is not solid, and later this precipitate is seen gradually to disappear, the medium becoming fairly clear, so much so that no one would imagine that it once had been milk. On agar-agar the growth is by no means abundant, and if it be sown in a tube in which the medium has been solidified in a sloping position, the growth will be, to a great extent, limited to the parts around which it has been sown, and will show itself as a pellicle of a roughly ground-glasslike appearance, but if sown in a tube solidified in the upright position, the pellicle will show a distinct wrinkling, as its growth in the centrifugal direction has been limited by the sides of the tube. On blood-serum the bacilli grow badly, forming a shabby thin film, with no characteristics. On potatoes a rapid and most luxuriant growth is soon obtained. At 18° C. one finds, after twenty-four hours, a thick, citron-white pellicle, with the central portion tending to a citron-yellow colour; after forty-eight hours this coloration will have been seen to spread outwards, while the central part has increased in colour, passing from this colour gradually to that of ochre, and still later assuming a colour identical with that of bread-crust, and after some days the whole potato will be covered with a growth of this kind; coincident with the increase of colour will be noticed a wrinkling of the pellicle, until at last the whole surface of the growth presents a tessellated appearance, while the potato under it is found to be moist—in fact, almost semi-fluid. If one examines such a growth, one finds it to consist almost entirely of spores, the capsules of which, with a 2½ per cent. solution of methylene blue (watery), take on a very faint blue tinge, but are almost invisible if fuchsin be used. The bacilli still present here are found to measure 2.5 μ to 3 μ in length and 0.8 μ to 1.0 μ in breadth, being slightly thicker in the centre than at the ends. It is an exception at this stage to find any of greater length. The spores are ovoid, and measure 1.0 μ —1.5 μ in length and 0.5 μ —0.75 μ in breadth.

Plate Cultivations.—After twenty-four hours, if the cultivation be a fairly active one, we find a good few colonies already liquefied. Fig. 9, drawn by my friend Dr. Francis Caird, very fully represents the condition. If such a plate, however, be examined with an objective of low power (74 diameters), it will be seen that in the depth of the jelly are many small colonies growing, but not yet causing any liquefaction. Figs. 1, 2, 3 show such a colony, and the subsequent changes it will undergo. It will be seen that, after some little time, minute branchings occur, which increase, until later they emerge on the free surface of the jelly, when liquefaction then begins. If, however, we look at a colony already pretty near the surface, we find it grows to a larger size without branching at all as in Fig. 4; and if this be watched, one finds that very soon a fine halo (Fig. 5) is thrown out all around the colony, while the central part deepens in colour, passing from a greenish-brown tint to that of a brown; this phenomenon usually marks the onset of liquefaction, which begins from the centre.

Fig. 6 is just a further stage of Fig. 5. Fig. 7 is a colony originally on the free surface of the jelly in which liquefaction has begun early, but in which the peripheral portion has been able quickly to spread outward.

If we now look at Fig. 9 again, we notice that the older colonies show to the naked eye a double outline, namely, a central circular one fairly sharply marked out, and an outer irregular one. Fig. 8 is such a border under a magnifying power of 74 diameters, and we find that while all within the central ring is liquefied, that comprised within the outer irregular ring is still solid.

Fig. 11 is from a micro-photograph, taken by my friend, Dr. Francis Troup, of a cover-glass impression of such a colony, and we see that the bacilli of the outer zone are arranged in a definite order, indi-

cating that the medium in which they are growing is still solid, and we further notice that their size is pretty uniform, namely, 2.5 μ in length, and 0.8 μ in thickness. In the central zone the jelly is quite liquid, and the bacilli being motile, we have them in all directions and in different sizes, some even advancing to the condition of leptothrix, 2 μ to 5 μ in length. But between these inner and outer zones we notice that there is a zone marked out by a dense mass of bacilli; this is the outer border of the liquid area, and here bacilli are evidently feeding in the solid gelatine around. Here, therefore we see three conditions of the life-history of this organism visibly depicted.

1. The outer border, showing growth by active division.

2. Middle zone, where the bacilli are actively motile, and are living a sort of amphibious existence, partly in fluid and partly in solid medium.

3. The central or liquid zone; here we find older bacilli, as evinced by the tendency to leptothrix formation, while the small points seen in the immediate centre of such a colony, and as seen in Fig. 9, but not here shown, mark the deposit of bacilli at the bottom of the liquid area either dead or dying, as, after the leptothrix condition is reached, we find motility ceasing, passing from the active lashing movement of the shorter bacilli through the slower and more sedate undulatory movement of the larger to the absolutely motionless condition of the leptothrix.

Another point which has been urged with regard to previous experiments is the want of control experiments on healthy skin. I felt such a necessity, but deemed that portions of the research themselves served as such. First, as regards the skin experiments, 10 per cent. of these were cases in which the wool was removed before the twenty-fifth day, and in no one of such cases did such bacilli appear, while they invariably occurred in cases examined later. Secondly, as regards the blood experiments, I might state that while during the past two years I have for various reasons examined blood, including that of scarlatinal patients, after the third day, yet I have never in any one of these cases, which number between 150 and 200, obtained it; while from the blood of patients who were known to be within the first three days of the disease, I have in each case obtained it under such conditions. I think I may fairly conclude that the bacilli in question came from the blood, the more especially that cover-glasses spread with such blood showed bacilli of such size and character as agreed with the cultivation afterwards obtained, and that, therefore, further control experiments are not an absolute necessity.

As to calf No. 2, which was alive at the time of publication of the previous paper, I may mention that it has since died (five weeks after the inoculation). At the necropsy it was found that there was extensive pericarditis, part of which was quite recent, but in parts there was complete organisation. The other viscera did not present any evidence of disease. The streptococcus rubiginosus, instead of being 0.4 μ , should be 0.4 μ to 1 μ , with a 0.8 μ as the average. The size of the ascobacillus, as described, is taken to apply to the smallest of the motile bacilli, but it is impossible to give a maximum size, owing to there being all gradations always proportionable in length and thickness from this up to the sausage-shaped bodies, which always tend to show a form analogous to the small bacilli, and it seems probable that they each are a further development of such.

REPORTS OF SOCIETIES.

EAST ANGLIAN BRANCH.

THURSDAY, JULY 14TH, 1887,

R. B. MARRIOTT, M.R.C.S., President, in the Chair.

President's Address.—THE PRESIDENT said that thirty-three years before, in the midst of an outbreak of Asiatic cholera, he took an assistantcy in a cholera-stricken district in Kent. The home of the disease seemed to be in the low part of the town, where there was a small bay into which the sewage from several houses ran, and which at low tide gave out awful odours. Round this bay every house was affected, but up in the more healthy neighbourhood it followed no law. He believed that all who had watched an epidemic, while giving full credit to the researches recently made, and willing to accept the bacillus theories, must feel that there was some law in its dissemination, of which science had yet to find the key. Scarcely had the cholera left when small-pox showed itself in its worst form, owing to the neglect of vaccination. The success of vaccination had been so great that in Swaffham there had been no case of small-pox for eight or nine years, to his knowledge; the last six times it had been introduced into the town it had not