INAUGURAL ADDRESS

ON

MODERN PROGRESS IN OBSTETRICS AND GYNÆCOLOGY.

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GENTLEMEN,—My first duty is to thank you heartily for the honour which you have done me in electing me as your President,—the greatest honour which can be conferred upon an obstetric physician. I enter with diffidence upon the duties of an office my predecessors in which have been such distinguished men and such successful Presidents, and trust only that, if there be any shortcoming on my part, the Society may not be the sufferer.

In evidence that our Society has never occupied a more prosperous position than at present as regards the number of its Fellows, I need only recall the fact that, during the four years of my treasurership which have just elapsed, its funds have increased by as much as £600, while during that time it has published the most valuable and costly volume of *Transactions*, from the number of its lithographic plates, which has ever appeared. The activity of its Fellows in scientific work has been no less manifest both by the quality of the papers contributed, and by the necessity, which has arisen for the last two years, for holding extra meetings in order that no papers might remain unread.

Of the two branches of medicine which form the main field of our Society's work—midwifery and the diseases of women—midwifery has for many years been furthest advanced on the way toward scientific perfection. A large part of its province has to do with questions of mechanics, which are both readily open to observation and experiment, and can in some measure be decided by rigorous mathematical deduction. Gynæcology, on the other hand, has been a field for conflicting opinions, for theories often accepted without adequate proof, and for changing and evanescent fashions of treatment. It is in the diseases of women, therefore, that the greatest activity of work and the greatest progress of discovery might be, if not expected, at any rate desired. Nevertheless, I think, be said, on a fair review of the work of the last few years, that midwifery has made even more striking advances than gynæcology. In one of the most notable of these Germany has taken the lead; I mean in the revolution which has taken place with regard to Cæsarean section. Only about six years ago the mortality of Cæsarean section was variously estimated at from 70 to 90 per cent. It even appeared that its mortality had actually increased as years went on, a result which could only be explained by supposing that operators were less bold than formerly in undertaking timely operations. Moreover, of the few who survived the operation, the majority were women living in the country. Comparatively few cases were successful in great cities, or in the hands of eminent obstetricians or surgeons. It appeared as if only country robustness could face so great a risk. Not many years before, an unusually successful operator, for that time, had contended that it was wrong to place sutures in the uterine walls at all, and that the uterus, in virtue of its contractile properties, would writhe until it got free from whatever sutures could be applied.

Now, the improved Cæsarean section, as performed under the most favourable circumstances at Dresden and Leipzig, shows a mortality over the whole series of only 9 per cent. The latter part of the series gives promise of a result for the future still surpassing this. The improvements in the operation introduced by Säger, especially the adaptation to the uterine wound of Lembert's intestinal suture, are doubtless of great value. But an important part also of Säger's work has been that he has popularised the operation, has led obstetricians to practically study it, and undertake it as a first choice, in cases of contracted pelvis, at the most favourable stage of labour. The importance of this element is shown by the relatively unfavourable result of Säger's

operation elsewhere, and especially out of Germany. Its general mortality for the last four years is thus raised to 26.8 per cent. The circumstance of greatest promise for the future is that the success has not been merely that of one or two operators of transcendent skill or unusually wide experience. Although it has been won mainly in German cities, and, above all, in two of them, the number of actual operators has been considerable, even at Dresden and Leipzig. Even throughout the whole of Germany the average success attained has been remarkable; 74 operations by 34 operators within the last four years give a mortality of only 14.8 per cent. These figures I give from the latest statistics, as communicated to me by Dr. R. P. Harris, of Philadelphia.

As yet, indeed, the result does not justify the claim which some enthusiasts have prematurely made, that craniotomy should be cast aside as a murderous procedure, and Cæsarean section in all cases substituted for it. This may, indeed, now be hoped for as a future triumph, but a greater, and—more important still—a more universal reduction of mortality must first be secured. Meanwhile, it is much that foetal life is already being saved, and the field of craniotomy reduced to those cases in which the risk of that operation to the mother in skilful hands is trivial.

An opprobrium to the obstetric art as great as Cæsarean section has been the impossibility of guarding patients having an extra-uterine foetation from the enormous risks of that condition, either by waiting upon Nature, or by primary operation. Here, also, much progress has been made, though more yet remains in the region of hope. In Cæsarean section Germany may, perhaps, always retain the lead which she has obtained, partly on account of the greater frequency of contracted pelvis in that country than in England or America; partly because, on the Continent, it has been usual to estimate more highly than in Britain the value of foetal life, as balanced against a degree of increased risk to the mother. In the treatment of extra-uterine foetation we may claim that this country has taken as leading a position as in other departments of abdominal surgery. I remember it being urged not many years ago, in this Society—not as a fact ever tested by experience, but only as a theoretical proposition—that, in a ruptured tubal foetation, the right treatment would be to perform abdominal section and remove the foetal sac. Now, cases so treated with success are being multiplied. In most of them, it is true, the operation has been performed after the primary collapse has passed off, and the patient has been saved from subsequent secondary risks, rather than from immediate death by hæmorrhage. But there have been cases of success, even in the stage of primary bleeding. We have already advanced so far that the risks of extra-uterine foetation may be regarded as greatly reduced, provided only an early diagnosis can be made.

Even in the far more formidable case of extra-uterine foetation in the latter months of pregnancy, opinions are turning again in favour of the primary operation, which had been almost abandoned as too disastrous to attempt. Only five years ago it was estimated that out of twenty-four primary operations at such a stage of pregnancy, only one mother had survived. This was the patient operated on by Mr. Jessop, who had a very narrow escape. But many of these cases, though they seem to tell in statistics against a primary operation, ought really to be regarded as in favour of it, because they were undertaken only because the patient had become moribund under the expectant plan. Recently our late President has given us an excellent example of success to follow. This much can already be said with assurance: whenever the foetal sac can be opened without the peritoneal cavity, or when the opening in it can be securely stitched to the abdominal wall, results ought to be far more favourable in future. One or other of these possibilities may be reckoned on in these cases of intra-ligamentous pregnancy, which have only lately been recognised as a separate and comparatively common variety, and which do not yet appear in the nomenclature of the Royal College of Physicians. Where the foetus is found free among intestines, or covered only with a thin amnion, probably the risk from decomposition of the placenta, if not from hæmorrhage, must always remain very great.

I should claim little for the treatment of extra-uterine foetation in the earlier months by faradisation, though it has been so highly praised in America. Since diagnosis is then often uncertain, and since an extra-uterine foetus often dies without any treatment, this is a case in which I think that less importance should be attached to so-called positive evidence than to the negative evidence that, when foetal life is proved, the most vigorous and persevering attacks may be made upon it by faradisation

without impairing its vigour in the smallest degree, as I have myself tested.

Another advance, which must be regarded as of greater importance than either of those which I have mentioned, in view of the possibly widespread saving of maternal life which it may effect, is the application of antiseptics to midwifery. A series of improvements culminated in the use of perchloride of mercury as an antiseptic, and the transformation as regards lying-in hospitals is already complete. It used to be considered, with justice, that it was safer for a woman to be delivered in the most miserable and insanitary hovel than in the most palatial and well regulated lying-in hospital. Now, it has been found possible to reduce the total mortality in lying-in hospitals as low as 5 or even 4 per 1,000, with an almost complete banishment of septic disturbances, and they are, therefore, as safe as any other place for delivery.

There is, however, a curious chapter in the history of the mortality of lying-in hospitals which has, I think, generally escaped notice, and which deserves attention, although I am unable to offer any explanation of it. In the closing years of the last century, a remarkable improvement was attained in the death-rate of, at any rate, some lying-in hospitals. It was ascribed to the improved knowledge of hygiene, and was celebrated in glowing terms, such as might now be applied to the results of the most fashionable modern antiseptics. At the British Lying-in Hospital the deaths per 1,000, which for the decennial periods between 1749 and 1788 had varied from 16.5 to 23.6, fell in the decennium 1789-1800 to 3.2, though the number of women delivered was greater than before, namely, 6,677, a result which surpasses even the best attained in lying-in hospitals at present.¹ At the City of London Lying-in Hospital, the mortality from 1790 to 1800 was only 5.7 per 1,000, from 1800 to 1810 only 4.3 per 1,000. The following quotation from Dr. Guy's Lectures on Public Health² will show how these facts were regarded:—

"Perhaps I cannot better exhibit the improvement that took place in the latter half of the (eighteenth) century than by giving you the figures of the British Lying-in Hospital for the first and last twelve years of that period of fifty years. There died in the first twelve years more than 1 in 15 children, in the last twelve less than 1 in 82. And, as I have before me the deaths of the mothers for the same year, I may state that while the death-rate for the first twelve years was 1 in 38, it was only 1 in 318 for the last twelve. These figures show a reduction of mortality in an institution which must have commanded the best medical skill and best nursing of the whole period under review, of more than fivefold for children, and more than eightfold for their mothers. In this reduction sanitary improvements in space, ventilation, and cleanliness must have borne a very considerable part."

Yet these brilliant results proved only transitory, and puerperal fever soon resumed its fatal ravages. In 1865-1875 the mortality of the British Lying-in Hospital was again as high as 19.4 per 1,000, that of the City of London Lying-in Hospital was 14.3 per 1,000, that of Queen Charlotte's Lying-in Hospital 22.3 per 1,000. At the Rotunda Hospital, Dublin, the improvement was not so marked in proportion to the old results, but the retrogression was quite as manifest. In 1791-1800 the mortality was only 8.8 per 1,000, in 1801-1810 only 9.7 per 1,000, but in the decennia from 1811 to 1875 it varied from 13.1 to 32.7 per 1,000.

We who are believers in antiseptics must be somewhat startled at these results obtained in the period from 1790 to 1810 by ordinary cleanliness and hygiene, before Semmelweis had enlightened the world as to the true nature of puerperal fever, and be puzzled to explain why they could not be maintained. With our present views of the nature and treatment of puerperal fever, we can scarcely suppose that the low mortality depended upon the treatment then in vogue for that disease, when it had arisen. The midwifery textbooks of the day recommend bleeding and emetics at the outset; later, antimony in the form of James's powder, and purging to the extent of producing four or five stools daily. The following passage occurs both in the 1798³ and in the 1832 edition of Denman's *Practice of Midwifery*. "I have very rarely attempted to inject medicines of any kind into the vagina or uterus, though, from a consideration of the probable state of the parts and of the foetid humours discharged it is reasonable to think that emollient or gently detergent injections might some-

times be useful. But the helpless state of the patient is such as to render the operation itself very troublesome; and, if they are advised, great caution will be necessary both in their composition and administration; but fomentations to the external parts have, I think, sometimes afforded comfort, and been of service."

Whatever may be the explanation of the retrogression in the sanitary condition of the lying-in hospitals after 1810, it can hardly be doubted that we are now upon a firmer foundation. The improvement is far more widespread in different countries, and the means by which it is attained are better understood. The hope may now be entertained that modern antiseptic methods would suffice to render healthy even a lying-in-ward in a general hospital, though it is premature to speak positively on the subject until the experiment has been tried. It is needless to say how valuable a small ward of this kind would be in a great medical school both for the advance of science and the education of students. Many medical men must look back with somewhat of horror upon their first attendance upon a case of midwifery. A student is fortunate if, through the aid of his fellow-students in charge of cases, he has learnt practically beforehand to discover the os uteri in labour. Happily Nature suffices for delivery in normal cases, and skilled aid is readily procured; so the patients do not suffer, as the statistics show. But if students could be instructed practically in the process of labour by competent teachers before taking charge of a case, they would be likely to make better use of their experience afterwards.

It is a far more important question how far the extension of antiseptic midwifery is likely to obtain for the country at large a reduction of puerperal mortality and morbidity at all comparable to that secured in lying-in hospitals. So great a reduction is not indeed likely, because the lying-in hospitals were the favourite home of puerperal fever. But even throughout the country, acknowledged puerperal fever, as returned to the Registrar-General, is responsible for more than half of the whole childbed mortality; and it may reasonably be suspected that septicæmia has to do with other deaths, not so diagnosed or not so returned. A reduction in puerperal septicæmia is therefore of enormous importance.

I think it probable that the decision of this question may throw light upon points yet obscure in the nature of puerperal fever. It by no means solves the question completely to say that puerperal fever is simply septicæmia. Of the microbes capable of multiplying in the body, those which can enter without a wound have naturally more frequent opportunities for displaying their effects; and, producing generally a definite set of symptoms, constitute some named zymotic disease. Microbes which can only enter through a wound are all massed together as yet under the titles of septicæmia and pyæmia, though as many as fifteen different species of microbes at least have been described as the essential cause of different forms of septicæmia in men and animals.

The recognition of the importance of microbes in puerperal fever has led many to regard as obsolete the old classification into autogenetic and heterogenetic puerperal fever; and doubtless it is now the most important lesson to impress upon practitioners that all puerperal fever is, in a sense, heterogenetic, since the germs must have come originally from without. Yet it remains a question of vital importance whether microbes constantly or commonly present, or only rare and virulent ones, are the active agents; and again, whether common microbes, which are generally innocuous, can be so cultivated in fertile soil as to become virulent.

Experience has shown that, in abdominal surgery, it is not of so much importance to destroy microbes as to avoid leaving any nidus for them in the shape of damaged tissue, or sanguineous effusion. It should not be forgotten that the same principle has its application in midwifery. Not even the use of the most fashionable antiseptic of the day would be a sufficient compensation for allowing unnecessary lacerations of cervix or perineum, for omitting to secure good contraction of the uterus, for leaving a ruptured perineum unsewn, or for bruising tissues needlessly in operations. But the special success in lying-in hospitals of the one particular antiseptic, perchloride of mercury, beyond all others, seems to indicate that the balance of importance is somewhat different in midwifery and in abdominal sections; and that, in lying-in hospitals at any rate, there are likely to be virulent microbes, which ought to be destroyed.

Whether the same principle applies to the prevention of sporadic cases of puerperal fever in private practice can only be ascertained by a trial of antiseptic midwifery by all practitioners on a scale which has not, I believe, been attempted in this country.

¹ "The Mortality of Hospitals, General and Special, in the United Kingdom in Times Past and Present," by Dr. Steele, *Journal of the Statistical Society*, June, 1877.

² *Op. cit.*, p. 19.

³ *Op. cit.*, p. 525.

The use of perchloride of mercury for internal douches, as employed in lying-in hospitals, would indeed probably involve the risk of doing more harm than good, through its occasional poisonous effects. Fortunately there is reason to believe that this is not the most important part of antiseptic midwifery. We are told that a drop of normal mucus from the cervix of a woman at the end of pregnancy, when drawn with a sterilised platinum rod across nutrient jelly, may produce as many as two hundred colonies of various forms of bacteria. All who have tried to render the vagina aseptic, in the sense of being sterilised, for gynaecological operations, will know how difficult this is to accomplish.

This is brought out strikingly by the recent researches of Steffek.⁴ No number of douches of perchloride of mercury will render the vagina aseptic at the end of pregnancy. To effect such a result, it is necessary to scrub vigorously with two fingers not only the vagina but the inside of the cervix, while a douche of at least a litre of the antiseptic is being used. Even this produces only a momentary effect, unless it is followed up afterwards by the use of at least four or five douches at intervals. It may be doubted if the vagina is ever sterilised so as to satisfy the more severe practical test of leaving therein for several days a glass tube containing bloody discharge, without decomposition occurring in it.

I think we may conclude that the microbes commonly present are generally innocuous, and that, in lying-in hospitals at least, and probably elsewhere as well, what has to be done is to prevent the entrance of virulent ones. I would venture to urge on all practitioners the importance of providing for themselves and the nurse the most efficacious antiseptic known, namely, perchloride of mercury, of a strength not less than 1 in 1,000. This should be used for hands, catheters, and any cotton-wool or sponges used for external washing; disinfection of the accoucheur's hands being the most important thing of all. Even the most complete unbelievers in antiseptics, if any such remain, must admit that this cannot possibly do any harm, and involves merely a little extra trouble. One practical detail is of importance. No one should trust to any tablets or powders of perchloride of mercury without testing them in dilute solution in the water of the district. It is obvious that, if the slightest milkiness is produced, it is impossible to tell how much of, or whether any of, the antiseptic remains efficacious. A concentrated solution made with a little glycerine and dilute hydrochloric acid in distilled water is more reliable, and has the advantage of the increased efficacy which the acid gives to the antiseptic in the presence of organic matter. The trouble of carrying a liquid is hardly greater than the trouble of dissolving tablets. As regards vaginal douches, my own view is strongly in favour of their routine use, with some efficacious but less poisonous antiseptic, such as carbolic acid; but I admit that this matter is open to difference of opinion, and that they are better omitted in normal cases, unless they can be used regularly by a competent person.

In most of the States of Germany stringent laws have been enacted for the use of antiseptics by midwives; and there is a general impression among German obstetricians that the conveyance of puerperal septicæmia has much diminished in consequence. I am informed, however, by Professors Leopold and Sänger, that, in Saxony at any rate, there has not as yet been manifest any appreciable diminution of the general puerperal mortality. Nearly one-half of the deaths in childbed are still ascribed to septicæmia. Fischel⁵ infers from Dohrn's statistics that the laws relating to midwives have not yet produced an improvement in childbed mortality in any German State as a whole, though they may have done so in individual towns. It is an obvious consideration that no laws can enforce the efficient use of antiseptics, however much they may prescribe them. We may at any rate console ourselves with the reflection that, unless death-registration is more delusive in England than abroad, our childbed mortality remains lower than that of either Germany or Austria.

Though the returns of the Registrar-General in England are thought not to indicate the whole mortality, they may afford some basis for comparison of different periods. They seem to show some improvement of late. The mean mortality of childbirth for 39 years, 1847-1885, is given as 4.82 per 1,000; but for the last ten years of that period as only 4.45 per 1,000. Yet as regards puerperal fever the report is not altogether satisfactory. Since the

year 1881, when a more stringent system was introduced by the registrar, of sending for further information as to previous parturition, whenever the death of a woman was returned as due to peritonitis, considerably more than half of the total mortality in child-birth is set down to puerperal fever, the minimum for the years 1881-1885 being 2.58 per 1,000. I think this affords ample ground for urging a more stringent use of antiseptics.

Meanwhile, a valuable experiment may be tried in the maternity charities of our great medical schools, the conditions in which approximate to those in private practice. In the charities of Guy's and St. Thomas's Hospitals, and, I doubt not, in others also, the use of perchloride of mercury is already being enforced. It must not be forgotten that the results here obtained, without any constant or systematic use of antiseptics, already equal or surpass even the best results of antiseptics in lying-in hospitals, and have steadily improved. Thus the mortality for the last ten years in the Guy's Charity was 3.4 per 1,000, for the preceding twelve years 4.4 per 1,000, for the first twenty-one years recorded 7.1 per 1,000. But here again more than half the deaths are still set down to puerperal fever. If a material reduction of this mortality through a more stringent antiseptics can be proved, it will be an enormous stimulus to the adoption of similar precautions by all practitioners.

Another problem not yet fully solved with regard to puerperal fever is its relation to zymotic diseases. Though it has been a widespread opinion in this country that puerperal fever may originate from the infection of scarlatina, this opinion must be regarded as shaken by recent evidence. It is worthy of note that recent researches attribute the secondary lesions of scarlatina itself, such as those of the ear and the joints, to a mixed infection by another species of microbe. It is possible that, in the theory of mixed infection, may be found some solution of the problem. Dr. Boxall's account of scarlatina in the General Lying-in Hospital suggests the hope that, if complicating septicæmia can be excluded, scarlatina may lose much of its terror for the lying-in woman. Yet further evidence is to be desired. For a single epidemic may be of mild type; and even long before the days of antiseptic midwifery, a series of nine cases of scarlatina in Queen Charlotte's Lying-in Hospital was recorded by Brown, in which there was no mortality, and from which no septicæmia resulted. I would suggest that records of erysipelas occurring in lying-in women are especially desirable; for erysipelas has been thought to be yet more closely allied to septicæmia and puerperal fever than scarlatina, and yet it is a zymotic disease, and is considered to depend upon a definite and discoverable microbe.

We have still to look to bacteriologists for some light upon the infectious character of puerperal fever. We hear of staphylococcus pyogenes aureus, streptococcus tenuis, and staphylococcus pyogenes albus being found. But these are comparatively common microbes, found frequently in mild and local suppurations. Unless they can acquire virulence by their growth in the puerperal woman, it is difficult to understand that they can account for such intense infection that, in the days before the need of caution was recognised, instances occurred like that of the midwife who, within one month, delivered thirty-one women, of whom seventeen died of puerperal fever.⁶

To the progress of gynaecology one of the greatest obstacles has been the difficulty of studying the morbid anatomy of the diseases of women. Most of these diseases are chronic complaints, which rarely prove fatal. Moreover, women much more rarely die during the active period of sexual life than men of a similar age, unless it is either from the effects of conception, from some acute zymotic disease, which modifies the tissues, or from chronic phthisis, which suspends the sexual functions; hence the difficulty which has been found in obtaining accurate evidence, even of the physiological states of the uterine mucous membrane during the menstrual cycle. Another difficulty of pathological study has been the fear of obstetricians that they might carry infection from the post-mortem room to their patients.

The recent extension of abdominal section in the treatment of diseases of women, while it has not been free from drawbacks and exaggerations, has, at any rate, advanced our knowledge of many complaints and put many popular theories to the test. We have learnt much, not only about inflammatory diseases of the Fallopian tubes, but about tubo-ovarian cysts, papilloma of the Fallopian tubes, and the pathology of ovarian growths in their earliest stages. Even if the enthusiasm of a surgeon for new and heroic modes of treatment leads him to operate needlessly, though

⁴ "Ueber Desinfection des Weiblichen Genital Canals," von Dr. P. Steffek, *Zeitschrift für Geburtshilfe und Gynäkologie*, Band xv, H. 2, 1888.

⁵ "Die Praktischen Erfolge der Modernen Geburtshilfe," von Dr. Wilhelm Fischel, *Centralblatt für Gynäkologie*, 1888, No. 32.

⁶ Robertson, *London Medical Gazette*, January, 1840.

some patients are the sufferers, science is not always without some compensatory advantage. Yet further improvement of our knowledge of pathology is to be expected from this direct mode of exploration in certain diseases.

In connection with this subject, I may congratulate the Society upon a reform which has taken place in London, and, I believe, in the provinces also—namely, the removal of restrictions upon the performance of abdominal operations by obstetric physicians at many of our great hospitals. Within the last four years such restrictions have been removed at five important medical schools in London, and there remains only one great hospital in which they are still perpetuated. Such a change, I believe, could not but happen sooner or later, in consequence of the extended field of abdominal section both in midwifery and the diseases of women; but the manner in which it has come about is a source of gratification in two respects. In the first place, it has been due, I believe, in all instances, not to any intervention of governors or other lay authorities, but to the good feeling of our medical and surgical colleagues. In the second place, the argument which has told most powerfully with our colleagues has been the favourable results obtained by those obstetric physicians in London who were earlier in obtaining the concession. Although, with perhaps almost an excess of modesty, they published no lists of their achievements, their success became known, and proved that it could not be maintained that obstetricians need be less competent operators than surgeons. Science can hardly fail to be the gainer through the increased number of observers. We shall have the less excuse if we fail to hold the balance fairly between the tempting prospect of rapid cure, at the expense of some physiological drawback and some risk to life, and the often wearisome treatment by less heroic means.

There are other subjects in which our knowledge of pathology is still defective, but in which further information can be obtained from the *post-mortem* room alone. Abdominal section has revealed much about the ovaries and Fallopian tubes—comparatively little about the uterus. But little is known of the histology of corporeal endometritis, apart from that form of it which causes hæmorrhage. It is still a matter of dispute how far it is right to describe such a disease as chronic metritis, apart from endometritis.

Other problems, again, cannot be solved by abdominal section alone, without careful comparison with the results of observations in the *post-mortem* room. I refer to such questions as the following: How far does chronic ovarian pain, in the presence of some disorder also of the uterus, justify a diagnosis of chronic ovaritis? To what extent are ovaries enlarged by many dilated follicles, or small and indurated with atrophy of follicles, to be regarded as pathological conditions, and as the source of important symptoms?

I have ventured to point out some subjects on which I think research especially desirable; but, in looking forward to the work of the year, I know that the active workers, so many of whom our Society is proud to possess, need no guidance, and that the contributions of the future will not fall short of those of the past in their scientific value.

ABSTRACTS OF THE MILROY LECTURES ON OCCUPATIONS AND TRADES IN RELATION TO PUBLIC HEALTH.

*Delivered before the Royal College of Physicians of London,
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LECTURE I.

AFTER some prefatory remarks on the history and literature of the subject, the lecturer proceeded to indicate the manner in which he proposed to classify the subjects to be dealt with. He divided occupations into two principal classes:—

1. The first, in which the occupation is unconnected with any manufacturing process so-called; or, in other words, those occupations which, in the language of political economists, are not directly concerned in adding to the wealth of the community.

2. The second in which labour is directed to raising new material is wealth from the earth, or to converting natural products

for the use of mankind, whereby they acquire a value not otherwise appertaining to them, by means of particular methods of treatment, comprehended under the term manufacturing processes. All such operations, therefore, augment the wealth of the country.

Though no hard-and-fast line could be drawn, these divisions were convenient; they were capable of further subdivision.

CLASS I.

Group 1.—Drones, or persons agreeably occupied in doing nothing.

Group 2.—The governing classes, represented by politicians and magistrates.

Group 3.—Professional, namely: The learned professions, fine art, science, literature, direction of higher education, architecture and engineering, land agents, money dealers (financiers, stockbrokers, etc), teachers of fencing and dancing,

Group 4.—Navy and army.

Group 5.—Persons in employments dependent on the professional and manufacturing classes, namely: Clerks, agents, secretaries, etc., school teachers.

Group 6.—Persons engaged in retail and import trades.

Group 7.—Manipulators of manufactured articles, namely—milliners, dress-makers, and tailors; dyers, carpenters, bricklayers; small manual trades as glove making, straw plait and hatmaking, chandlery, soapmaking, etc.

Group 8.—Domestic servants, including waiters, coach and stable men, and drivers of hackney carriages.

Group 9.—Labourers, including warehousemen, packers, etc.

CLASS II.

Group 1.—Agriculture, including gardening and forestry.

Group 2.—Mining.

Group 3.—Manufacture.

The lecturer said that he proposed in these lectures to deal only with the last two groups in Class II, and continued as follows:

A review of the health-relations of mining and manufacture, for the purpose of adequate discussion and proper elucidation, compels me to attempt a classification based on what appears the most obvious agent whereby each several occupation becomes injurious to human well-being. To carry out this etiological plan, I make nine groups of conditions causative of disease among workmen in mines and factories:

1. By the generation of dust.
2. By the employment of materials of a distinctly poisonous or highly noxious nature.
3. By the evolution of vapours of poisonous or injurious properties.
4. By the action of excessive temperature.
5. By evolution of electricity.
6. By abnormal atmospheric pressure.
7. By circumstances affecting the special senses.
8. By excessive use, friction, or strain of parts of the body.
9. By exposure to infectious, contagious, or parasitic diseases.

A tenth (10) group might rightly be instituted for occupations especially chargeable with accidents, but as it is not my intention to treat of accidents in these lectures I shall content myself with this allusion to the matter.

The range and severity of these several groups of disease-producing agencies specified differ widely. The first three operate extensively and in a multitude of occupations; the rest have limited spheres of action, and, for the greater part of them, possess less energy for evil. Again, it is seldom that the morbid conditions represented by any one group are found alone as disease factors. Those of any two or more may be conjoined, when the problem arises: To which of them do the observed injurious consequences belong? For example, the evils of dust are frequently aggravated by the inherent deleterious qualities of that dust, and may be further intensified by the presence of heat and moisture. So, again, the overheating of workrooms may have its injurious consequences augmented by vicissitudes of temperature and by postures of the body detrimental to the general well-being.

Nevertheless, the establishment of these primary factors in the production of trade diseases is only one step towards the solution of the problem as to how far the pursuit of an occupation is chargeable with the entire sickness and mortality experience shows to be connected with it. In other words, the study of details will speedily convince us that, besides these primary or intrinsic factors, there are many circumstances of a collateral character that give intensity to them, or otherwise modify their activity, but are not essential parts of the manufacturing operations. These collateral conditions I shall call extrinsic.

To leave their consideration out of sight in estimating the consequences of any occupation upon health from bare statistics of mortality or of sickness, will vitiate the conclusions arrived at. It has already been noticed that Dr. Headlam Greenhow, after having most diligently examined the mortality returns of manufacturing and of non-manufacturing towns, perceived distinctly