THE BOWMAN LECTURE

ON THE

PARASITICAL DISEASES OF THE EYE.

Delivered at the Special Meeting of the Ophthalmological Society of the United Kingdom.

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MR. PRESIDENT AND GENTLEMEN,—The invitation which I received last year from the Council of your Ophthalmological Society was—I must say—a very welcome one. I value very highly the great honour which this invitation brings with it, the more so as this lecture has been instituted with the design of gratefully commemorating the services which Sir William Bowman has rendered to science. I am fully conscious of the honour of being allowed to speak in commemoration of a man so greatly esteemed all over the Continent, and especially in my own country, because of his distinguished and pre-eminent scientific position. But, having in the first moment cheerfully and decidedly consented to accept the honour conferred upon me, I afterwards felt the whole weight of my responsibility, and began to fear that I should not be able to discharge the duties which I had undertaken. It is a well-known fact, that, in treating of difficult matters, it is not always easy to find the right words and the proper expressions, speaking even in the mother tongue; and I venture to speak before you in a language, not quite different from the German in its earliest origin, to be sure, but very different in its later development. I beg to apologise for all incorrectness of speech and deficiency of elegance. Indeed, I feel sure you will overlook them.

The aim of my lecture will be to lay before you an account of the parasitical diseases of the eye—diseases very little known in earlier times, but now more and more occupying the attention of the scientific world. The late Dr. Mackenzie, in his *Practical Treatise of the Diseases of the Eye*, had only one short chapter—the last of his book—treating of the entozoa of the organ of vision. To-day, in consequence of the investigations of modern science, this chapter ought to be greatly enlarged. The entozoa of the human eye, mentioned in the fourth edition of Mackenzie's treatise, which was at that time the most valuable and the most complete work on ophthalmology, are almost all visible with the naked eye, namely: (1) filaria; (2) monostoma and distoma oculi humani; (3) echinococcus hominis; and (4) cysticercus cellulose. Let us see what is known at the present time of these species of entozoa. Von Nordmann may be looked upon as the first observer of the natural history of minute living creatures in the eye. He examined an immense number of eyes of fishes, amphibians, birds, and mammals, and found therein several specimens of different entozoa. Examining the human eye, he, and Gescheidt, and von Ammon found in its crystalline lens also several parasites. In the extracted lenses of an old man, von Nordmann found two specimens of a filiform worm, and a similar one in the cataractous lenses of an old woman. As it was impossible to give an accurate description, he named it filaria oculi humani. In another lens of an old woman he found eight specimens of monostoma, which showed some slight motion after being put in lukewarm water. Gescheidt and von Ammon also found in the cataractous lens of an old man three extraordinarily slender worms, which they closely described and judged to be the same filaria seen by von Nordmann. In a child of five months, which died of atrophica meseraica, they found between the opaque crystalline lens and its capsule four specimens of distoma oculi humani, of which they gave a detailed description. It is to be presumed that this distoma might have been an incompletely developed specimen of distoma hepatis (Leuckart). Von Nordmann as well as Gescheidt were, in the branch of helminthology, very eminent investigators, and strictly truthful in their accounts. There can be no doubt that what they saw in the human eye and what they described was really that which they deemed it to be. But it is most astonishing that, ever since, neither monostoma nor distoma has been found in cataractous lenses, though the microscopes of to-day are much more powerful than those of fifty years ago, and though a very great number of cataractous lenses have been very closely examined.

These observations belong, therefore, to what I may call a traditional period of the history of parasitical diseases. Nearly the same may be said of the filaria in the human crystalline lens; whereas

filaria in other parts of the eye, especially under the conjunctiva, is, according to Guyot, a very common disease among the negroes of Congo. This worm seems to live only in the West of Africa, in Guinea, on which account it has the name Guinea worm; but a certain number of zoologists do not think it to be quite the same as the filaria medinensis. It has, therefore, been called filaria loa, the word loa being the name of the worm in the language of the inhabitants of Congo. It is, as far as I know, only observed in the eyes of negroes;¹ and it is said that no case has been recorded in America since slavery has been abolished.²

Echinococcus in any part of the human body is, except in Iceland, a very rare disease. Mackenzie refers to two cases of echinococcus in the orbit, but there have been published about forty. Echinococcus has never been found in other parts of the eye except in the orbit. It causes, to be sure, more or less protrusion of the eyeball; but it does not impair the sight in any other way, and may easily be removed by operation.

Cysticercus.—Mackenzie quotes only the few cases of cysticercus cellulose, known at the time of the publication of his book. The fourth and last edition was published in the year 1854, a few years after the discovery of the ophthalmoscope in the year 1851, and I might have said "the invention of the ophthalmoscope," but Helmholtz himself has repeatedly said that it was much more a discovery than an invention, and so I cannot but use the same expression. The discovery of the ophthalmoscope signalises the beginning of quite a new period of our special science. The internal diseases of the eye were, up to that time, we may say, quite unknown. The ophthalmoscope enlightened the darkness in which internal diseases of the eye were hidden, and, respecting the entozoa of the eye, showed that the cysticercus cellulose does not only reside under the conjunctiva, or in the anterior chamber, or in any other part visible with the naked eye, but even in the retina and in the vitreous body, where it cannot be seen otherwise than with the aid of the ophthalmoscope; in fact, it chooses its domicile more often in these parts than anywhere else in the organ of vision. It is very remarkable that the cysticercus has been seen in Berlin, and in some other places in the North of Germany, in a much larger proportion of cases than elsewhere. Von Graefe, of Berlin, was the first to observe a cysticercus with the ophthalmoscope in the internal parts of the eye, and was the first to extract it by an operation. He had already seen a considerable number of cysticerci before the first was seen at Vienna in the autumn of 1865. This curious fact is difficult to explain. At first one could deem it probable that the use of the instrument was better understood at Berlin than at Vienna, because it was in use at Berlin almost six months or more before it was known at Vienna. But its practice was very quickly acquired, and I need not say that Eduard Jaeger, of Vienna, was one of the most accurate observers with this instrument, and was the first to publish pictures of the fundus oculi of an admirable and unsurpassed exactness. It is necessary to look for another explanation.

Since the experimental investigations of Küchenmeister and Leuckart, it has been well known that there are two different species of tapeworm residing in the digestive tube of the human body, the one with a crown of hooks round its head, the other without it. The first stage of these tapeworms, the cysticercus, exists likewise in two different forms, the one with hooks, the other without them. These crowned tapeworms in their first stage—the cysticercus—live especially in pigs, sometimes in an exceedingly great number, and in some other animals, and also in the human body. The cysticercus without hooks lives in the body of cattle, but never in the body of pigs. This fact has been sufficiently proved by feeding experiments. It is worth noting that this cysticercus without hooks, living in cattle, has never been found in the human body, neither in the eye nor elsewhere. It seems to be nearly certain that pork is consumed to a much larger extent in the northern than in the southern countries, and that the tapeworm with hooks is much more common in the north than in the south; the consequence of this will be that the cysticercus (with hooks) must also be much more frequent in northern than in southern countries. But the more one studies this question the more one finds that both tapeworms, the *tænia solium*, and the *tænia mediocanellata*, exist in a nearly equal proportion everywhere, and therefore the before mentioned question is far from being satisfactorily answered. Let me quote only a few figures to prove what I just have said.

The late A. von Graefe, of Berlin, found one cysticercus, visible with the ophthalmoscope in the internal parts of the eye among about

¹ Leuckart, *Die Parasiten des Menschen und die von ihnen herrührenden Krankheiten*, 2 Aufg., Bd. ii, page 620. Leipzig. 1886.

² Blanchard, "La Filaire sous-conjunctivale." *Le Progrès Méd.*, No. 30, page 611, 1886.

one thousand patients. His cousin, Alfred Graefe, of Halle, found them in about the same proportion, whereas Dr. Berlin, of Stuttgart, found one cysticercus among 40,000 patients; Dr. Hansen-Grut, of Copenhagen, only one cysticercus among 70,000 patients; Dr. von Wecker, of Paris, only one cysticercus among 60,000 patients; and Dr. Mauthner, of Vienna, not one among 30,000 patients. The first and only intra-ocular cysticercus in Belgium was seen last year (1885). This is, indeed, a very remarkable disproportion, well worthy of being more closely investigated. Another equally remarkable fact is, that cysticercus in the internal eye is not nearly so rare as in any other part of the eye. The late A. von Graefe, of Berlin, only once saw a cysticercus in the crystalline lens (this being the only time that one has ever observed it in this structure); once in the orbit; three times in the anterior chamber; five times under the conjunctiva; in contradistinction to more than 80 times in the retina, and in the vitreous body. Similar observations have been made by Alfred Graefe, the professor at Halle, who in his large practice sees four or five cases of intra-ocular cysticercus annually, whilst he has seen only one in the anterior chamber during a period of eight years. The brief history of cysticercus in the human body is this: Eggs of the tapeworm enter in one or other way into the human stomach. The thin covering of these eggs is dissolved by digestive action, and the living little cysticercus appears. To be sure, it has not yet been really observed, but it hardly seems possible that there could be any other means for it to reach the eye, than that this minute animal passes through the wall of a blood vessel, entering thus into the circulatory system. Carried along with the blood it may be stopped somewhere—for instance, in the choroid—and then it creeps out, like a white blood corpuscle in a case of inflammation. Its behaviour in this place is different. It seems that the worm has a tendency to get into the vitreous body, and this action is performed with more or less impetuosity. If seated in the choroid, or under the retina, the moving of the worm gives rise to a large detachment of the retina and sometimes one has observed that it really creeps through the retina into the vitreous. This process cannot be performed without causing the patient great discomfort. It often excites a vehement inflammation with insupportable pain, and produces dense opacities in the vitreous, so that the minute animal can hardly be distinguished with the ophthalmoscope. If seated in the retina the little worm does not do so much harm, and generally gets more easily into the vitreous, without exciting such disagreeable sensations. Then, the vitreous remaining clear, the parasite can be perfectly well seen with the ophthalmoscope. In a few cases one could distinctly see the crown of hooks and the movements of the animal.

According to the difference in the behaviour of intra-ocular cysticerci, different modes of treatment are required. If the cysticercus is very unsteady and rambling, it will be necessary to perform enucleation of the eyeball directly; if it behaves quietly, and if the patient does not suffer much pain, it may be allowed to remain for a time. But, as far as we know this very rare disease, periods of quietness and periods of restlessness are constantly alternating; and, finally, the eyeball shrinks, and sight will almost always be entirely lost. That is the reason why some operators do not think it advisable to wait at all, but perform the operation in any case in which the presence of a cysticercus is well established. This being so, it will be the best plan to operate as early as possible, when there are no inflammatory symptoms. Instead of enucleation, one has successfully tried to extract the little animal from the eyeball. This was first performed, as I have already mentioned, by A. von Graefe. He made a large iridectomy, and afterwards extracted the worm, with cannula forceps, through a scleral wound made about two lines behind the corneo-scleral margin. Many other oculists have since that time successfully, as well as unsuccessfully, tried to do the same, by more or less similar operations. What has been done in this way by Alfred Graefe, of Halle, is of much interest. No oculist has performed an equally large number of operations for cysticercus. In his last publication (Albrecht von Graefe's *Archiv für Ophthalmologie*, Bd. xxxi, Abth. 4, p. 33, Berlin, 1885) on this subject, he refers to forty-five eyes afflicted with intra-ocular cysticercus, operated upon by him in the eight years 1877 to 1885. The immediate result of these forty-five operations was completely satisfactory. In thirty cases, the parasite was caught and extracted, in only one of which an unusually profuse loss of vitreous followed. In fifteen unsuccessful operations, the want of success in extracting the worm was due to dense opacities of the vitreous not allowing an exact determination of its seat, or to an unsteadiness of movement, the animal being in the middle of the vitreous, and floating about in all directions. The best chance for a successful extraction is when the worm is steadily seated between the retina and choroid. Twenty-four out of the successful cases the author of this publica-

tion had the opportunity of seeing again some time afterwards. In almost all these twenty-four patients, pain and other inflammatory symptoms had entirely subsided, and the eyeball had preserved its natural form, though in some cases it was weaker than normal. The sight of the patients had improved, and in one or two of them to a considerable degree. In the fifteen cases in which it was impossible to remove the animal, it afterwards appeared necessary to remove the whole eyeball or the anterior part of it, an operation which must be performed when pain and other inflammatory symptoms arise. These are the results of forty-five operations performed by Professor Alfred Graefe, of Halle. Few of our special *confrères* have had the opportunity of performing this operation, and only a very small number of these have performed it more than once. From the rarity of a cysticercus residing in the interior of the eye, this disease is, in a practical sense, of no great importance, but scientifically it is highly interesting. There is no living parasite whose course of life in the living human body can be studied with less trouble and with greater exactness than a cysticercus living in the eye.

These are almost all the parasites of the organ of vision visible with the naked eye. But, there is another series of microscopical parasites, belonging to the vegetable kingdom, practically of much greater importance. Of these we have now to treat. These micro-organisms are the lowest forms of life we know, but by no means the most indifferent for our bodily welfare. They are such small objects that it is impossible to see them unless we use the strongest magnifying power of microscopes of the very best construction, but by their enormous multitude and power of propagation they can nevertheless do us very great harm. Pasteur has demonstrated that the air owes its property of decomposing organic substances to minute particles suspended in it, which are the germs of various low forms of life, long since revealed by the microscope, but not previously shown to be the essential cause of putrescence and decomposition of organic substances. This fact was primarily only a theoretical one, but Sir Joseph Lister was the practical man who succeeded in making the knowledge of it useful for the benefit of mankind, in giving the impulse to scientific studies, which originated thoroughly new ideas of diseases and of the means of curing them. You know better than I can possibly tell you the great merits of Sir Joseph Lister with respect to his antiseptic method; I wish only to mention that he, bearing in mind that all the mischief in healing wounds arises from the vitality of these atmospheric particles, and directing his attention especially to the subject of suppuration, found carbolic acid well adapted for the treatment of open wounds. Some years passed away before the profession began to trust in these new ideas, and I remember perfectly well the first trial made with a great deal of incredulity at Rostock, and the general astonishment in observing what a remarkable retardation of suppuration was the result of this treatment. Ophthalmology, always attentively looking round for some possible advancement, did not wait very long in applying the principles of this treatment to eye diseases, especially to the after-treatment of cataract extraction. The members of this Society, who were present at the International Congress held in London in the year 1881, will well remember the communication on the antiseptic method in ocular surgery made by Professor Horner, of Zurich, in which he said that loss of eyes following a perfectly normally performed extraction of cataract had long been known, and that an exact analysis of all the cases of primary suppuration after cataract extraction left no doubt that it depends on infection. The most complete analysis of the results of cataract extraction shows a loss of 10.1 per cent. by the flap operation, and a loss of 4.8 per cent. by the linear operation, which loss has been reduced at Zurich to 1.5 per cent. by strictly observing the measures of antiseptic treatment. This is a wonderful practical result of what is rightly called Lister's antiseptic method. But Lister's antiseptic method was not only fruitful in a mere practical sense; it has greatly contributed to thorough investigation of all those living germs which occasionally invade the human body; it gave rise to the question—what are these living germs?

The profession in all parts of the world has earnestly tried, and is still trying on a large scale, to give an answer to this question. This research has originated quite a new science, called bacteriology. Bacteriology has already determined a great number of different species of these micro-organisms, and has described their forms, their food, their manner of living, etc.; but it is impossible (and, in the meantime, useless) to give here an exhaustive account of the systematic differences of these microzoa, and of the multitude of names given to them. Some of them, there is no doubt, are very dangerous to health. Some are, perhaps, innocent, and some (why should it not

be so?) may have a salutary influence. For our purpose it will be sufficient to divide them into only two classes, the pathogenic and the non-pathogenic microzoa. For this distinction we can refer to experiments made on animals. If there is an effect produced by any microzoon on the eye of an animal, then it may be argued that a similar effect may be expected upon the human eye. Rabbits are the most docile and the most patient animals, and therefore are mostly used for such experiments. Hence any microzoon will generally be called "pathogenic," which leads to infection in the rabbit's eye, and will be called "nonpathogenic," if in the rabbit's eye it does no harm, so that what results in the rabbit's eye will show us what is to be expected in the human eye under similar circumstances. But here we are on uncertain ground. These conclusions evidently are correct only on the assumption that the tissues of the rabbit's eye and the tissues of the human eye are absolutely identical. That, however, is not the case. There are some microzoa very dangerous to rabbits and relatively innocuous to the human body, whilst others are dangerous to human health and relatively innocuous to rabbits. *Gonococcus* and *Staphylococcus aureus*, for instance, the most dreaded of all microzoa, because of their great tendency to provoke suppuration, are in the rabbit's eye relatively indifferent micro-organisms. The conjunctiva of the rabbit and the conjunctiva of the human eye are therefore not equally good abodes for certain microzoa. It is the same with other animals; each one has its own idiosyncracies for nourishing and for starving micro-organisms.

But not only is the difference of the same tissue in different animals the reason of a different behaviour of the same microzoon, the tissue itself in one and the same individual may change under different conditions of life, and may consequently not be identical during the whole lifetime. It is quite possible that changes may take place during life, unknown perhaps to ourselves, but very important to the respective micro-organisms. I will only allude to vaccination, which evidently changes the nutrient soil, so that the microzoa of small-pox can no longer live in it, they no longer find nourishment, and the vaccinated body remains unaltered by an infection which would have been fatal to it if non-vaccinated. These views concerning small-pox, introduced by Dr. Jenner, are now about to be generalized for nearly all infectious diseases. It may be ascertained, as a matter of observation, that certain micro-organisms cannot live in an animal when certain others have already taken possession of its body, whereas they may be pernicious to it when certain others are not present (Emmerich, *Tageblatt d. 59 Versammlung Deutscher Naturforscher und Aerzte*, 18, bis., 24th September, 1886, p. 145). But it has not yet been ascertained whether they change the nutrient soil into a sterile one, or whether they devour or kill each other. There is one other remark to be made; that is, that the quantity of microzoa invading the human body is also of great importance. Just as poison has its poisonous property only with respect to the quantity, and can be a wholesome remedy when taken in right proportions, although deadly when taken in too large a dose, so a small quantity of pathogenic microzoa, assailing the human body, may be innocent, whereas the danger increases with the increasing quantity.

If it is true that not every nutrient soil is equally well adapted to every microzoon, one microzoon developing better in one soil than in another, it must consequently be true, that one or other nutrient soil is exceedingly well adapted to a certain species of micro-organism. Supposing this to be a fact, some authors have formed the idea that an exceptionally well-nourished and well-developed microzoon might show some difference from the same microzoon when badly nourished, and might, for instance, grow larger and thicker, or even change somewhat its original feature, or changes its character in so far as its pathogenic activity might be lessened as well as strengthened. This idea is, to a certain extent, analogous to what daily experience teaches with respect to plants and animals. Plants put in a convenient soil may grow extremely well, and may, to a certain extent, change their colour, smell and other qualities, but, put in a bad and inconvenient soil, they will fade and die. Concerning the microzoa this may be the same, but it has not yet been sufficiently proved by facts.

We will now briefly consider some of the microzoa which produce diseases of the eye.

The Normal Conjunctiva.—The surface of the normal conjunctiva is covered with a fluid, which is composed of pure water secreted by the lachrymal gland, and of some fat and slime secreted by the minor glands of the conjunctiva. The germs of all living microzoa floating in the air can every moment drop into the open eye, and remain on the surface of the conjunctiva. Hence, it cannot be astonishing that one finds, in every normal eye, plenty of germs of all possible kinds of micro-organisms. Of two persons, with quite normal con-

junctivæ, it has been found that one eye almost always contains pathogenic germs. (Gifford, *Archiv für Augenheilk.* Bd xvi, p. 197).

Why does not then the eye become inflamed every moment? Conjunctivitis is, as you know, a very common disease: that it is not much more common than it really is, that it does not arise every moment, may be explicable partly by the passing of these germs through the lachrymal canals into the nose, where they probably may be innocuous, partly by the qualities of the conjunctival tissue itself, it being, in some people, a bad soil for nourishing and feeding germs, in others a good one.

The most common of all forms of conjunctivitis is the phlyctenular, called by the authors of a more remote period conjunctivitis scrofulosa. This is a form arising chiefly in children, and only exceptionally in adults. The search for a particular microzoon in these phlyctenules has not yet been successful; it would require very delicate manipulation; but, in the fluid which moistens the conjunctiva, there have been found seven or more different forms of microzoa, partly pathogenic, partly nonpathogenic. The authors of a more remote period, who preferred the adjective "scrofulosa," thought this disease to be a blood-disease, which occasionally comes out and subsides. There has never been the least doubt in the mind of any practitioner that this disease is nearly always combined with some other symptoms of scrofula, that it arises chiefly in scrofulous children, and that, in these children, it often becomes so dangerous that the eye is lost. We are far from exactly knowing the connection which exists between scrofula and phlyctenular conjunctivitis; but it may be that these infectious germs find an easier and better nourishment in an unhealthy conjunctiva than in that of a quite healthy child, the unhealthy one being uneven and perhaps better fitted for sheltering micro-organisms. The same argument will explain the frequent recurrences of scrofulous or strumous ophthalmia.

As to the treatment of this disease, powdering the eye with calomel is nearly universally adopted as the best remedy, and its use quite harmonises with the bacteriological theory. Calomel, not soluble in distilled water, becomes soluble by the addition of some salt. Tears, containing a small quantity of salt, the powder of calomel brought into the eye, will be, and is chemically proved to be, dissolved in small quantities, and changed into chloride of mercury; which is an excellent antiseptic solution. A weak solution of chloride of mercury was formerly a frequently used collyrium for the same eye disease. It has now been almost entirely displaced by the subchloride of mercury or calomel, perhaps because the chloride of mercury *in statu nascendi* may have a still better effect than a weak solution of it has.

Conjunctival Blepharorrhœa, or Purulent Ophthalmia.—Another very dangerous parasitical disease of the conjunctiva is blepharorrhœa. The micro-organisms residing in the gonorrhœal matter, first discovered by Neisser, and named by him "*gonococcus*," is identical with the micro-organisms found in purulent ophthalmia. The etiology of blepharorrhœa in new-born children is well known, and the discovery of the gonococcus in both diseases further supports their mutual relation. Nitrate of silver is an excellent antiseptic, and it has long ago proved, in various ways, well adapted for curing blepharorrhœa, or—to speak in modern terms—it is well adapted for killing the gonococcus. It is not only suitable for curing blepharorrhœa, but even for preventing it, that is to say, for killing the gonococcus before it has damaged the eye. For preventing this disease, Credé, of Leipzig, gave the advice to drop one minim of a 2 per cent. solution of nitrate of silver into the eyes of every new-born child. With this preventative treatment he succeeded in reducing the high percentage of 12 per cent. and more of ophthalmia neonatorum in his Lying-in Hospital to $\frac{1}{3}$ per cent., and even to less than that. I am not sure if it will be advisable to adopt this treatment as a general rule, but its adoption in lying-in hospitals will very likely save a very great number of eyes, especially in those hospitals in which cleanliness is an unknown thing. At the meeting of the Imperial Surgical Society of Paris, on February 21st, 1866, M. Giraudeau (*L'Union Méd.*, No. 8, 23 et 26, 1866) reported that in the Hôpital des Enfants Trouvés, the loss of eyes (sometimes even of life) by blepharorrhœa neonatorum reached the enormous number of 80 to 90 per cent.; to-day we are not very far from reducing the number of eyes of new-born children lost by this pernicious disease to zero. This, within twenty years, is really a respectable progress of science.

Trachoma.—That trachoma is caused by micro-organisms seems to be a well established fact, though all authors are not of the same opinion on this point. The microzoon, described under the name of *diplococcus* of trachoma, is, as regards its form and configuration, very like the aforesaid gonococcus, only it is much smaller. It represents a very small ball, cleft by a tiny line, which can only be seen

by the most powerful microscopes. This diplococcus can very well be cultivated in different nutrient soils, whereas gonococcus can only be cultivated in serum of blood; in other nutrient soils it does not grow. The diplococcus of trachoma has its seat inside the trachoma follicles, but outside the cells; whereas gonococcus lives in the cells or at the outside of the conjunctiva—at least, does not enter deeply into this membrane. Diplococcus of trachoma cannot be successfully inoculated into the conjunctiva of rabbits; but it is said that it has more than once been successfully inoculated into the human conjunctiva. Gonococcus, one of the most dangerous microzoa of the eye, is very easily transferable to the mucous membranes of any animal. As to the treatment of trachoma, a variety of drugs has been successively recommended, but sulphate of copper is the one that is most generally in use. In comparison with nitrate of silver, it may perhaps be preferable, because it is less energetic, and does not act so superficially. Its action certainly proceeds deeper into the tissue, and may, therefore, be better adapted to reach the diplococcus, which is seated, not on the surface, but in the follicles of the conjunctiva. The method of squeezing, or cutting, or scratching out the follicles has practically proved useful, and is, bacteriologically, quite correct.

Sacculus Lacrymalis.—The lacrymal sac is like a reservoir for the fluid secreted by the conjunctiva. This fluid, always more or less loaded with micro-organisms, is stopped by the least impediment on its way to the nose, the sac being thus stuffed with microzoa. Fortunately, they may not be altogether pathogenic; but some, or a great part of them, being pathogenic, it will be a very dangerous collection in the neighbourhood of the eye. When the sac is filled up, the outlet to the nose being closed, the fluid may occasionally regurgitate into the conjunctiva, and may greatly endanger its safety, being innocuous only when it contains non-pathogenic organisms alone. The presence of a stricture in the lacrymal duct, and a filling up of the lacrymal sac with matter, has long since been considered a dangerous complication. Practically, it will always be advisable to pay great attention to this complication, the relative quantity of pathogenic and non-pathogenic microzoa being variable. The least wound of the cornea, the least loss of its epithelium, as well as any operation, opens a way into the deeper layers of the cornea, and allows of the entrance of micro-organisms. The result of this, if the microzoa are pathogenic, will be a grave suppuration.

There exists a form of keratitis, called *ulcus serpens* and *keratitis-hypopyon*, the dangerous course of which, well known to the profession, can hardly be explained except by infection.

Keratitis mycetica.—The first time we met with the word *keratitis mycetica*, which means inflammation of the cornea, caused by micro-organism, was in the year 1875. At the ninth meeting of the Ophthalmic Society, Professor Horner, of Zürich, demonstrated the cornea of a patient, who died in consequence of facial erysipelas, having suffered in the last days of his life from a large ulceration in the lower part of the cornea. The microscopical sections of this cornea seen with the naked eye showed a great number of fine straight lines running out from the ulcer in a centrifugal direction; seen under the microscope, this network of straight lines proved to be dilated lymph canals of the cornea filled with numerous minute spherical bodies, all of about the same size. The members of the Society who were present were persuaded that this case was really of a mycetic character, and that the spherules seen in the cornea were specimens of the coccus of erysipelas.

There are still other diseases of the eye probably depending on parasitical infection. Microzoa have been found in a chalazion; they have been seen in the internal parts of the eye—in the iris, in the choroid, in the ciliary body, in the optic nerve; local and general tuberculosis has been successfully produced by inoculating the bacilli of tubercle into the anterior chamber of a rabbit's eye; it has even been attempted to prove that sympathetic inflammation is produced by the wandering of micro-organisms along the optic nerve and through the chiasma to the other eye; but all this is not yet sufficiently explained, and much laborious and long-continued work is still required. Bacteriology is at the present time a very young and incompletely developed science; it cannot yet answer all the numerous questions arising every day. The result of all this long-continued work may be that some day the etiology of human diseases and bacteriology will be found to be nearly identical sciences. Everywhere one finds micro- and macrozoa persecuting, vexing, and killing each other; everywhere one finds parasitism, and, in the material sense of the word, the human race itself is nothing less than a parasite on the surface of the earth. To save his own life, to nourish his own body, the human being destroys and kills every creature—plants as well as animals—if he deems it proper for his own welfare. And he is allowed so to do by the words of the Holy

Bible. This state of things in the material world corresponds exactly to what your great philosopher Hobbes calls

"bellum omnium contra omnes."

But in a moral and intellectual sphere this sentence is out of place, and has to be altered into

"pax omnium inter omnes,"

for in the moral and intellectual sphere there exists no personal interest, no parasitism; the individual being an integral member of the great body of mankind, and having, as such, to seek for knowledge of the works of our Creator, and consequently to admire and to love Him.

THE DIAGNOSIS OF URÆMIA FROM APOPLEXY.

By C. W. SUCKLING, M.D. LOND., M.R.C.P.,
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CHAUTERNESSE and Tenneson, in the *Revue de Médecine*, November, 1885, relate cases of partial epilepsy and hemiplegia in Bright's disease which they have, by *post mortem* examination, proved to be due to local oedemas of the brain.

I believe that it is not generally known that hemiplegia occurs in uræmia, thus occasionally making the diagnosis between uræmia and apoplexy an extremely difficult one. As in uræmia the treatment must be one of active interference, while in apoplexy the opposite holds good, the diagnosis is of the utmost importance.

I have recently met with two cases similar to those reported by Chauternes and Tenneson. A man aged 40 was recently admitted into the workhouse infirmary in a comatose condition, with right hemiplegia and without convulsions. The pulse was of high tension, the heart considerably hypertrophied, and there was a trace of albumen in the urine.

All these symptoms were compatible with the diagnosis of cerebral hæmorrhage. To my astonishment, he recovered consciousness immediately after being bled, the hemiplegia passing off in a few hours.

During his stay in the infirmary, he had five other attacks, which were always preceded by delirium and restlessness, together with violent convulsion of the right side of the face, right arm and leg, and conjugate deviation of the eyes to the right, giving place to hemiplegia, the eyes then being turned to the left. Each attack was cured by a small bleeding. The urine in this case was free for days from albumen, though it was tested at various periods of the day.

The other case was that of a woman, aged 62, brought in one evening completely comatose. There was right hemiplegia, conjugate deviation of the eyes to the left, dilatation of the right pupil, and abolition of the right conjunctival reflex.

The breathing was of the "Cheyne-Stokes" type, the heart a little enlarged, but the pulse of low tension. Clonic spasm of the facial muscles occurring at short intervals, the case was suspected to be uræmic, though the urine apparently was not albuminous, and I ordered her to be bled. One ounce and a quarter were drawn, and she became conscious almost immediately after.

The next day the hemiplegia had disappeared, but she had sensory aphasia, there being "word blindness" and "word deafness." Free purgation was kept up, and within two days she was perfectly well.

On testing the urine by daylight, I found there was a slight trace of albumen present, the quantity of urea being only 1 per cent., and the average daily quantity of urine passed being forty ounces. I could discover no casts, and there was no change in the fundus oculi.

In both the above cases, the temperature was a little below normal; and in both no history of the onset of the attack could be obtained, the patients being brought in from the street by the police. In the diagnosis of these cases, the occurrence of convulsions is of great assistance. A convulsion occasionally occurs at the onset of apoplexy, but is rarely repeated, while in uræmia convulsions are common, and usually frequently repeated; any elevation of temperature would be strongly in favour of apoplexy. In all cases, when in doubt between apoplexy and uræmia, I should bleed.

CONSUMPTION HOSPITAL, BROMPTON.—At the last quarterly meeting of the governors, the following legacies were announced: Miss Sprott, £300; Miss Cayley, £50; Miss Nightingale, £1,000; Rev. W. H. Edmeades, £50; Miss Keating, £20; Mr. G. K. Smith, £100; Mr. C. G. Du Pré, £300. The number of patients admitted since August 5th was 514; discharged, many greatly benefited, 396; died, 86; new out-patient cases, 4,082.