the following month (September). There being an increase in the pain referred to the teeth, I asked my brother, William Hern, who was spending his holiday with me, to see the case, which he accordingly did, and discovered an exposed nerve in the second left upper bicuspid, and at once advised its removal, considering it the probable cause of the pain. The vision of the left eye was carefully tested late in September, and found to be $\frac{3}{8}$ L. Tension +1 L.

On October 5th the tooth was extracted, and sent direct to my brother for a report on its *post-mortem* condition, which I will give in his own words: "Upper second bicuspid of left side affected with a very large and deep carious cavity on its anterior surface, involving the pulp chamber, and a smaller and shallower one on its posterior surface. On splitting, the pulp was found to have been alive, its free surface ulcerating and covered with thin greenish pus, its deeper parts intensely red and injected; the pulp tissue altogether being in a state of great irritation, and a potential cause of much pain, both local and reflex." He also says: "I have seen several cases amongst my patients at the Dental and Middlesex Hospitals of undoubted reflex ophthalmic disturbance due to dental caries, in which the lesion was less clearly marked than in this case. In a few cases which have been sent me from Moorfields or from the out-patient ophthalmic department of my own hospital, an exposed pulp in some lurking position has most commonly been found to be the irritating cause."

As to the progress of the case after the extraction of the tooth, the pain disappeared immediately and did not recur. For a fortnight the condition of the eye appeared to remain absolutely stationary, and then gradually the lesion gave in, and disappeared in from six to eight weeks, leaving a slight haziness of the cornea, with the usual thinning of the sclerotic, giving the blue coloration of the choroidal pigment over the seat of the sclerotic patch. Tension in L. became equal to that of the R., and sight returned to the extent of $\frac{3}{8}$.

Having given a fair trial to all the recognised methods of treatment before the extraction of the tooth, I at that time ceased to administer all internal remedies, and simply applied a solution of boracic acid locally. Although the *post quod ergo propter quod* is not a safe method of reasoning, yet the gradual spreading of the patch up to the time of the extraction of the tooth, the sudden check produced thereby, the gradual diminution, dating from a fortnight after the extraction, and, finally, the gradual return of the eye to its normal condition, point, I think, to the probability that in this case, at any rate, we have an example of an irritative lesion reflexly produced, in which the afferent nerve is the superior maxillary, or second division of the fifth nerve, and the efferent the first division of the fifth and probably its nasal branch.

INFANTILE OPHTHALMIA (BLENNORRHOEA NEONATORUM) AND ITS PREVENTION.

Read in the Section of Ophthalmology at the Annual Meeting of the British Medical Association, held in Leeds, August, 1889.

By KARL GROSSMANN, M.D.,

Ophthalmic Surgeon to the Stanley Hospital, Liverpool.

THE matter which I propose bringing before this meeting to-day is not a new one, neither do I expect to meet with any serious opposition to the remarks with which I shall conclude.

The efforts of therapeutics at the present time are directed pre-eminently towards prevention rather than towards cure. We have come to this position by degrees, and I need only mention the names of Pasteur, Lister, and Koch to characterise at once the wholesome movement in the midst of which the present generation has the good fortune to find itself. If some men have been going too far in attributing almost every complaint to the invasion of a micro-organism, we have on the other hand gained an invaluable treasure in the knowledge that one of the most important rules of treatment is the most scrupulous cleanliness. Dirt is, surgically speaking, matter in the wrong place, and therefore obnoxious, at least as a mere intruder if not as an actual offender. Exclusion of all obnoxious matter is the great principle which has led to such astonishing success in recent surgery; and in medicine it has given the impulse to the rapid develop-

ment of hygiene, the branch which sees in the prevention of diseases the best remedy.

Even in ophthalmology, where we have for a long time been accustomed to results unparalleled in general surgery, we have adopted, every one of us I trust, the antiseptic *régime*, modified of course to our special requirements. Is it not therefore time that we should try to stamp out a disease which not only can be cured completely if treated in time, but which also, as we now know, can be easily prevented altogether? Is it comprehensible that this disease, which causes the blindness of about one-third of all the inmates of our blind asylums, makes its ravages, now as in years gone by, to maintain the population of these institutions?

It is not difficult to find out the cause of this gloomy state of affairs. Let us take a typical case from our hospital practice. A woman, confined about two or three weeks ago, brings her child to us. Before she says anything, a glance at the eyelids swollen and glued together, probably with some creamy discharge oozing out, is usually eloquent enough, and with a sigh, "probably too late again," do we examine the poor little creature. Alas, too often our anticipations are realised. Sometimes one, usually both corneae have been perforated, the iris has prolapsed, and the mischief is done for life. Maybe we can hold out a hope to restore some sight by an artificial pupil later on, but that entirely depends on the seat and the extent of the injuries.

And how did this come about when we know it could have been prevented if taken in time? The same sad old tale: "Three or four days after birth baby caught a cold." The mother either did nothing to it, or if she did anything at all it usually was a bread and milk poultice or something similar.

The near connection of infantile blennorrhoea with gonorrhoeal discharge has been conclusively demonstrated for a great number of cases by the presence of that peculiar micro-organism to which the name of "gonococcus" or "diplococcus pyogenes" is given. It occurs in agglomerations of two, which form the shape of an 8; hence the latter name. Whether this diplococcus, which is so constant in gonorrhoeal discharges, is also to be made answerable for all cases of purulent ophthalmia in the newborn is a question which is at present still an open one. I have repeatedly failed to discover it in discharges from the conjunctiva; and my observations in this direction are not uncorroborated. At the fifty-seventh meeting of the German Medical Association, Dr. Kroner of Breslau gives the result of his examinations of ninety-two cases of blennorrhoea. He was unable to discover the gonococcus in twenty-nine cases, in spite of the most careful examinations; in sixty-three cases, however, the micro-organism was readily detected. This led him to the conclusion that the ophthalmoblenorrhoea may be produced not only by the gonorrhoeal secretion of the maternal vagina, but also by other vaginal discharges of a less specific nature.

Be that as it may, the fact remains that the ophthalmoblenorrhoea of the newborn admits of a cure—I should almost like to say, in the words of the label on the Offen bitter water, "speedy, sure, and gentle." We know it is far more profitable to cure quickly purulent ophthalmia in a child than in an adult. Evidently the infantile cornea is better supplied with nutrition, and chemosis does not occur so easily; and whereas in the adult we have to fear destructive processes in the cornea sometimes within a few hours, which we cannot always keep off, the eye of the newborn shows much greater tolerance, and usually only gives way after a few days of irrational treatment, such as poulticing and other domestic remedies.

I have tried different remedies—nitrate of silver, corrosive sublimate, liquor chlori, iodoform, sulphate of copper, carbolic acid, peroxide of hydrogen—and I must say they all give good results, either alone or in combination. I have done this in order to convince myself that there is no special remedy particularly to be recommended as a specific; they all answer admirably, although I have chiefly relied upon nitrate of silver until lately, when I have used β -naphthol with great advantage. It does not matter much which of these remedies we apply on the whole, iodoform being rather objectionable on account of its odour, and I mention them only in order to show that as far as treatment is concerned we have ample means to cope with it successfully and quickly. But the little patients are brought to us usually when the gravest harm is already done.

To have shown where the root of this deleterious disease lies, and how we can readily get at it, is the great merit of Dr. Credé, of Leipzig. He pointed out that it was far more within the range of the obstetrician than of the oculist to prevent ophthalmo-

blennorrhoea in the newborn altogether. In a paper¹ which I read eight years ago, before one of the Branch meetings of this Association I first drew attention to this method which, slightly modified at present, consists in the following: As soon as the umbilical cord is attended to the child is washed, and the closed eyes wiped with a clean rag or pad of cotton wool. The eyes are then opened, and one drop of a 2 per cent. solution of nitrate of silver is dropped into each eye by means of a rounded glass rod.

I will give here a compilation of the results as published by Credé in 1887:

Before using any prophylactic treatment.					
1874	...	323 births, of which 45 blenn.	=	13.6	per cent.
1875	...	287	"	37	" 12.9 "
1876	...	367	"	29	" 9.1 "
1877	...	360	"	30	" 8.3 "
1878	...	353	"	35	" 9.8 "
1879	...	389	"	36	" 9.2 "
1880 (Jan. to June)	187	"	"	14	" 7.6 "

After introduction of prophylactic treatment.
1880 (June to Dec.) 200 births, of which 1 blenn. = 0.5 "

The percentage was reduced from 13.6 to 0.5 (or more correctly speaking to 0.0), because it was found that in that one case the prophylactic treatment had been omitted by mistake.

Thus the great value of Credé's method has been fully established. The only objection which has been made against it is that the 2 per cent. solution of nitrate of silver is perhaps rather strong—too strong to put into a healthy eye of the infant. Against this it may be said that weaker solutions seem to do equally well down to 0.5 per cent., and that weak solutions of sublimate (0.03 per cent.) and other antiseptics have been used with the best success. If any irritation takes place it is only the case in premature children, and has, as far as I could convince myself, never been followed by any serious results.

The prophylactic method of Haussmann is free from this drawback. He lays great stress on the disinfection of the maternal mucous membrane, and on all the instruments used during birth. It goes without saying that he also advocates a careful cleaning of the face and eyelids of the newborn, but he stops short of the instillations into the conjunctival sac. Still, from the comparison of the two methods, that of Credé seems to deserve our complete support. Koenigstein tried both in the Vienna clinic on a large scale, and found the following result: of 1,300 children treated by Credé's method, 0.5 per cent. were affected, while the method of Haussmann showed 2 per cent. in a series of 1,541 cases of birth.

I give here some statistics gathered in some of the large Continental obstetrical institutions since the introduction of the prophylactic treatment.

Credé himself publishes for

1880, out of 211 cases, 1 case of blennorrhoea
1881 " 400 " 1 " "
1882 " 418 " 2 " "
1883 " 131 " 0 " "

The Berlin Charité, which used to have from 13 to 9 per cent. between the years 1876 and 1880, came down in 1883 (first batch), out of 460 cases, 7=1.5 per cent.; (second batch), out of 260 cases, 0=0.0 per cent. Bonn, 1883, out of 703 cases, 4=0.5 per cent. Dresden, 1887 (first batch), out of 1,000 cases, 4=0.4 per cent.; (second batch), out of 420 cases, 0=0.0 per cent. Giessen, 1885 to 1887, out of 330 cases, 0=0.0 per cent. Marburg, 1884 to 1888, out of 943 cases, 0=0.0 per cent. Grosswardein, 1883 to 1888, out of 714 cases, 1=0.15 per cent.

These statistics are eloquent enough; they prove that the evil can be coped with successfully, and how this may be done.

In 1884 a deputation (committee) selected from the Ophthalmological Society was in communication with the Registrar-General concerning this subject. The propositions made by that committee were not accepted, and nothing seems to have come of it in the meantime. It was pointed out by the Registrar-General that, if the suggestion of distributing printed slips were adopted, additional labour and expense would be incurred. About two years ago the Committee of the Bradford Eye and Ear Infirmary made an attempt to carry out this idea by supplying the registrars of their district with such slips. The expense was a very small one—about 25s.; and it was thought that, at that rate, the cost for

the whole United Kingdom would come to about £30 per annum. Whether the distribution of those slips has helped to diminish the occurrence of the deleterious instances of blennorrhoea neonatorum I have not been able to ascertain satisfactorily, but let us inquire one moment into this question of expense.

It has been estimated by the committee referred to before that about 30 per cent. of the blindness met with at present was caused by infantile ophthalmia. This means, of course, total blindness of both eyes, and comprises, according to the last census, about 7,000 individuals. If we were to add those cases where one eye only has been destroyed, or where sight has been left just sufficient to get along somehow, this number would be greatly increased; but let us, for argument's sake, take the number as low as 7,000, and let us calculate, similarly to what Magnus did for Prussia, what these 7,000 blind individuals mean.

If we take a very moderate average of the weekly earnings of a healthy person, we may put it down at 20s., or yearly, £52. The blind is not only unable to earn his living, but, on the contrary, must be kept and fed. Let us say he requires about 1s. a day for his keep, etc., which would make about £18 a year. He therefore represents an annual loss of £52+£18=£70. This is a very moderate calculation, but still it brings us for the 7,000 blind individuals to a total of £490,000, or about half a million of annual loss, which might be easily prevented, not to speak of the enormous amount of misery which could have been avoided at the same time. Will these simple figures be eloquent enough to make the situation a little clearer? Will they help to demonstrate that a small amount of extra labour would be well spent?

Quite recently the Local Government Board were asked to have some directions of advice printed on the vaccination cards which are given by the registrars for births. This demand was declined, and, as I think, very rightly, for the reason that it would not be expedient to give optional directions and compulsory ones on the same paper. And I do not think that such cards, even if distributed, would be sufficiently effective with an indifferent populace to stamp out the disease in question. Preventive measures ought to be taken of a far more thorough nature, and they should be made compulsory.

It is now the general custom in this country that among the poorest classes confinements are attended by a midwife when a medical man cannot be present. Here, then, is given the principal starting-point for any wholesome and wholesale reform. This has been recognised by several foreign States, where regulations to this effect have already been adopted, as, for instance, in Saxony, the regulations for which I have here printed for your inspection.

I will not go into any more details, but simply submit to your discussion the following reformatory suggestions:

1. Each midwife ought to be instructed during her time of apprenticeship about the symptoms and treatment of infantile ophthalmia. This ought to be notified on her certificate.
2. Every newborn child ought to be subjected to the preventive instillation of a weak solution of nitrate of silver or other suitable solution—that is, equally useful and non-poisonous (one drop, after the eyelids have been cleaned out with cotton-wool, and the hands and arms of the child have been well washed). The midwife ought to be compelled to do this in every case.
3. In every case where the signs of an inflammation of the eyes occur from the third day to the end of the confinement, the midwife should be compelled to give notice to a medical man (in cases of the poor, to the parish doctor or some other authority).
4. In case the midwife omits any of these points, her certificate should be withdrawn and a fine imposed.

The PRESIDENT quite coincided with the views expressed in Dr. Grossmann's paper, and would be very glad if Dr. Grossmann would persevere in his efforts towards so desirable an end as the stamping out of infantile ophthalmia. He also agreed that sometimes cases were observed where even the greatest care was not able to prevent disaster; of course, these cases were very rare.—Dr. ILLINGWORTH said if their curative measures could be improved preventive ones would not be required. He found invariably, from a fairly large experience, that the biniodide of mercury would cure the disease in from four to five days.—Dr. BURNETT (Washington) was much pleased to listen to the valuable paper of Dr. Grossmann, since it was in the same line in which there was an attempt to do some work in the United States. At a recent meeting of the American Ophthalmological Society Dr. Lucien Howe, of Buffalo, had brought forward some statistics

¹ An abstract of this paper is published in the first number of the *Liverpool Med.-Chir. Journal*, 1881. I should feel inclined to ask you not to read it; it was one of my first English compositions, and is very badly worded, written in a regular "English as she is spoke."

showing that blindness was increasing in the United States in an enormously greater ratio than the population. The Society had appointed a committee—of which Dr. Howe was chairman, the other members being Dr. Andrews, of New York, and the speaker—to investigate and report on the question of preventable blindness. The committee was not yet ready to report, but Dr. Howe had visited Europe and Egypt gathering material, and before long it was hoped something tangible in the way of statistics and suggestions would be offered. But at any rate enough had been discovered to substantiate the statement of Dr. Grossmann that a very large part of the blindness was due to purulent ophthalmia of infants, which they knew now was preventable. Here, of course, the all-important thing was prevention, but this could only be carried out by the midwives, nurses, and general practitioners. How were they to second them? was the question. Much might be done by individual effort, but without doubt legislation of a very strict nature was essential to the proper and efficient carrying out of any plan. They, however, must do all in their power to arouse the people and the authorities from their apathy in the matter. Some such plan as that suggested by Dr. Grossmann was no doubt good as an initiative, but they must not relax their efforts until the strong arm of the law took hold of the matter and protected the community against a disease which was nothing less than a national calamity.—Mr. LINDSAY JOHNSON stated that he entirely agreed with Dr. Grossmann that it mattered very little what antiseptic was used, provided always that the eye were left uncovered and the pus immediately syringed out whenever it accumulated. He had repeatedly cured cases in a few days with the use of a 1 per cent. solution of common alum, and he thought most gentlemen present would agree that the rapid removal of pus was of far more importance than the kind of antiseptic used.—Mr. SIMMONS SNEEL said the importance of the subject could not be overrated. He thought it would be well for the Section at its first meeting next year to adopt a resolution urging the subject on the attention of the authorities, and to get it confirmed at a general meeting of the Association, as was done at the International Medical Congress in London in case of colour-blindness in sailors, railroad employes, etc. Besides any public or joint action much could be done by them as individuals. For instance, for some time he had distributed cards, setting forth the dangers of the disease, to parents or friends attending at the Sheffield General Infirmary with babies with purulent ophthalmia, and desired them to keep them in a prominent place in the house, and to draw their friends' and neighbours' attention to them. He had referred to these and also to other ways in a paper read before the Yorkshire Branch in February last year,² and had then travelled over much of the ground treated of by Dr. Grossmann. He gave there also statistics of the frequency of blindness from this disease in the children at the Sheffield School for the Blind carefully examined by himself, the percentage being 38.3. Whilst agreeing as to the value of Crds' plan, he remarked that in the paper alluded to he had recorded the excellent results obtained at the Hospital for Women, Sheffield, by simply giving attention to the eyes immediately the head was born, and washing with pieces of lint and tepid water the eyes and adjacent parts. In the last 2,000 labours no case of purulent ophthalmia occurred. Korn had recorded also his experience, and had found this method sufficient after a trial of less simple methods.

MUSCULAR ADVANCEMENT.

Read in the Section of Ophthalmology at the Annual Meeting of the British Medical Association, held in Leeds, August, 1889.

By F. R. CROSS, M.B.LOND., F.R.C.S.,
Bristol.

IN cases of faulty position of the eye and its visual axis, where we should not expect tenotomy to do much good, the operation of advancement has deservedly grown in favour with ophthalmic surgeons of recent years. I have had many opportunities of doing this operation, and feel that it is a safe and satisfactory procedure, and one that can be widely applied. I therefore venture to make some remarks bearing upon it, although I cannot expect to add anything to the knowledge possessed by those present at such a meeting as this.

In the consideration of an operative procedure for the cor-

rection or improvement of any malposition in the visual axis sound anatomical knowledge of the orbital muscular mechanism and the structures supporting the globe and limiting its movements in different directions is of the first importance.

Each eye globe is part of a ball-and-socket joint, closely resembling the hip or shoulder in being supported partly by its capsule and partly by the periarticular muscles, which surround and are in most intimate connection with it. The socket, partly muscular, partly aponeurotic, is so fixed to the anterior half of the orbit that it suspends the globe in such a way that no shifting of the eyeball is possible beyond a rolling in the socket.

The capsule is itself fixed to the wall of the orbit (being suspended from its roof), and strengthened by a network of aponeurosis from the recti muscles, whose tonicity tends still further to maintain its position.

The internal surface of the capsule is attached posteriorly to the groove on the surface of the scleral continuity of the optic nerve, and is further fixed by the ciliary vessels and nerves which perforate it. Just in front of these it is free from the sclerotic, except for the prolongation forwards from it of a little connective tissue, which, passing forwards, becomes more definite, and is known as the subconjunctival tissue, and at the circumcorneal margin unites capsule and sclera, so that they here form one structure.

The outer surface of the capsule is in close contact with the structures that lie outside it; posteriorly it rests on the fibrofatty mass in the back of the orbit; and in front it forms the subconjunctival tissue. Its intermediate portion lies underneath the orbital muscles, sending backwards fascial coverings over them. Anteriorly it is prolonged forwards, folding around the tendons to their insertion into the globe, and then passing still further forwards the prolongations reunite to form a fan at the outer edge of the cornea.

The prolongations of Tenon's capsule, forming the sheaths of the tendons, are in such intimate relation with the muscles that they act as auxiliary tendons, and require the fullest consideration in an operation, and so does the anterior attachment of the capsule, for an alteration in its position means an altered relation of the visual axis.

It is not sufficient merely to divide the tendon itself, except when the case is very slight, because these slips of Tenon's capsule also need division. Being in direct continuity of the fascie of the muscles, and enclosing their tendons, they act as auxiliary vincula between the muscles and the eyeball, whose relative position they are sufficient to maintain to a considerable extent after the tendon has been divided.

The ocular muscles lie outside Tenon's fascia, but their tendons are closely associated with it, and together are like the meshes of a net. Thus, when any change in the direction of the pupil is required they all act in unison, a proper tension is maintained throughout all the fibres of the capsule, and an equable pressure is exerted on the globe of the eye. The capsule also is prevented getting into folds under the varying movements.

The capsule with its intimately associated muscles is moreover rendered more perfect, and a more stable socket for the movements of the eye, by means of fanlike prolongations which pass all round to the walls of the orbit from the sheaths of the muscles. The most important and strongest of these passes out from the sheath of the external rectus, just as the muscle gets under it; it is directed to the outer wall of the orbit, 2 millimetres behind and a little above the external palpebral ligament. It contains muscular bundles and constitutes the "external orbital muscle."

This small muscle is of much importance in tending to draw the sheath of the external rectus out towards the wall of the orbit, and away from the globe of the eye. In the primary position of the eyes, the external rectus wraps closely round the globe, and is in actual contact with it from behind forwards for a distance of 13 millimetres; and this amount of contact is increased when for any reason the eye is rolled inward.

With efforts of extreme convergence, as in high degrees of myopia, the increase in contact surface produces an increase of pressure along the outside of the antero-posterior diameter of the eyeball, and causes a lengthening in the antero-posterior diameter of the eye. The abduction exercised by the external orbital muscle upon the sheath of the external rectus lessens this inward pressure upon the globe. It also acts as a stop tendon to excessive action of the muscle, and as a retractor pulley.

The degree to which each muscle of the eyeball wraps round

² *Lancet*, 1888, vol. ii, p. 413.