ABSTRACTS

I.—FOREIGN BODIES IN THE EYE AND ORBIT

A systematic analysis of the Discussion held during the 1916 Session of the Ophthalmological Society of the United Kingdom.

(Transactions, Vol. XXXVI, pages 63 to 137.)

This somewhat long discussion on foreign bodies in the eye and orbit, with special reference to prognosis and treatment, is of very great importance as representing the ideas at the present date of leading British ophthalmic surgeons. As in all such discussions, it is difficult to remember the various points made by the various speakers, with the result that one does not easily realize the actual trend of the prevailing views on each particular subject discussed. It has therefore been thought worth while to make an analysis based, not so much upon the speakers, as upon the subjects touched on by them. Looking over his notes—which are somewhat voluminous—the reviewer considers that the following are the chief headings under which most of the matter can be brought, although he does not pretend that the order he has selected represents necessarily the order of importance: (1) prognosis and treatment in general; (2) localization; (3) the various magnet types and their use; (4) the route selected to reach the foreign body; (5) siderosis; (6) sympathetic disease; (7) peculiarities of military cases; (8) references to the compensation of workmen.

The discussion was introduced by A. L. Whitehead (Leeds) and J. Herbert Parsons (London). It is not intended here specially to differentiate these two speakers from the others.

I.—Prognosis and treatment in general

Whitehead.—Prognosis and treatment depend upon (a) the presence or absence of sepsis: glass and porcelain and also pieces of metal are frequently aseptic; (b) size of the foreign body; (c) site and depth of the foreign body, the prognosis being good in inverse proportion to the depth; (d) the nature of the foreign body. Non-magnetic bodies are difficult of removal unless visible from the front. Glass may remain for many years without symptoms; it may become encapsulated, but, if in the vitreous, cicatricial changes and retinal detachment may result. Copper is always bad unless it be embedded in the lens.

Magnetic bodies are taken up under heading III.

With regard to the question of removal of the eye, Whitehead's rule is to enucleate if there is no vision and a foreign body is suspected.

In industrial work goggles are a prophylactic measure, but are not welcomed by the worker, because, if made of wire,
they interfere with vision by their nature, and, if made of glass, they become pitted and interfere with vision.

**Parsons.**—Problems of prognosis and treatment centre round the smaller missiles, since large bodies at high velocity destroy the eye. Since \( E = \frac{1}{2}mv^2 \) a small foreign body must have enormous velocity to penetrate the eye. Metallic bodies are more often sterile than non-metallic because the former are more often hot when emitted.

The influence of the nature of the foreign body on the pathological condition set up is profound and varied. Thus copper causes suppuration in the absence of organisms (Leber), leucocytosis being set up by chemical action. The suppuration may be delayed for some time by a wall of inflammatory material. Copper in the lens may cause little reaction. Wagenmann reported a case in which a fragment of copper remained in the lens for 27 years; ultimately cataract formed, and the copper was removed with the lens, being found in the nucleus. Only very rarely does copper become encapsuled with restoration of useful vision. Metals other than iron and copper usually remain quiescent; lead becomes coated with carbonate. Stone is chiefly dangerous from infection. Glass and porcelain may cause little reaction but eventually there is irido-cyclitis and disorganization of the eye. The most common infective organism is probably the pneumococcus.

Speaking of magnetic foreign bodies, Parsons recalled Goulden's order of prognosis, which the reviewer tabulates in the following order of progressive deterioration of prognosis:—

1. viâ the cornea, lens intact, vitreous not reached.
2. " lens injured " " "
3. " lens intact, vitreous reached.
4. " lens injured " " 
5. " sclera" " 

Parsons makes it a strong point that while a wound of the lens always makes the prognosis worse, this is more particularly the case in children. The large amount of swelling readily results in anterior synchia and glaucoma, while the risk of sympathetic (already great in children, vide infra) is also increased. As bearing on the general question of prognosis, Parsons quotes Hildebrand regarding the frequency of the various routes taken by the foreign body to reach the vitreous, namely:—

<table>
<thead>
<tr>
<th>Route</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) through cornea, pupil, and lens</td>
<td>6</td>
</tr>
<tr>
<td>(2) &quot; iris, and lens</td>
<td>16</td>
</tr>
<tr>
<td>(3) &quot; iris, and zonule</td>
<td>6</td>
</tr>
<tr>
<td>(4) &quot; sclera</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>43</strong></td>
</tr>
</tbody>
</table>

Foreign bodies on or in the retina may become encapsuled: this depends on asepsis. The retina may degenerate and become
FOREIGN BODIES IN THE EYE AND ORBIT

detached. Encapsulation is often rapid with iron, and useful vision may persist indefinitely, but particles more than 1 to 2 millimetres in diameter almost invariably destroy the eye either by sepsis or siderosis.

Craig (Belfast).—The speaker was emphatic on the importance, from the prognostic standpoint, of early treatment. He made it a rule to see the patient on the day of the accident. The foreign body is much more difficult to extract if sufficient time has elapsed for the formation of fibrinous effusion or organized blood clot, so that the body becomes incarcerated. When a foreign body is in the lens Craig would extract through a radial incision if steel, but, if inert, he would leave it alone and wait. He mentioned that he had seen cilia carried into the eye comparatively frequently, a fact which was commented on by Whitehead, in replying to the discussion, as perhaps due to the long eyelashes of the Irish.

Gray Clegg (Manchester) contributed largely to the discussion. He had tabulated all the cases coming under his care in the Royal Eye Hospital, Manchester, as in-patients, with an actual foreign body in the globe or its coats or in the orbit, from 1900 to 1915. From this table (which is reproduced in extenso in the Transactions) the following points bearing upon prognosis emerge:

- Of all in-patients 2:2 per cent. have a foreign body in the eye or orbit.
- Of all out-patients 0:125 per cent.
- Of all accident cases 0:51 per cent.
- Of the 130 cases tabulated the following shows the position of the foreign body:

<table>
<thead>
<tr>
<th>Location</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornea</td>
<td>9</td>
</tr>
<tr>
<td>Sclera</td>
<td>5</td>
</tr>
<tr>
<td>Anterior chamber</td>
<td>11</td>
</tr>
<tr>
<td>Iris</td>
<td>6</td>
</tr>
<tr>
<td>Posterior chamber</td>
<td>1</td>
</tr>
<tr>
<td>Lens</td>
<td>12</td>
</tr>
<tr>
<td>Vitreous chamber</td>
<td>71</td>
</tr>
<tr>
<td>Retina</td>
<td>1</td>
</tr>
<tr>
<td>Choroid</td>
<td>4</td>
</tr>
<tr>
<td>Lid</td>
<td>1</td>
</tr>
<tr>
<td>Ethmoidal cells</td>
<td>8</td>
</tr>
<tr>
<td>Orbit</td>
<td>130</td>
</tr>
</tbody>
</table>

Clegg discussed at considerable length the various factors which influence prognosis. Only one or two points can here be specially mentioned. One is as to the treatment when the lens is wounded, a grave factor in the prognosis. It is a moot point, he said, whether it is wise to express injured lens substance, either through the wound or through any corneal section that has to be made at the time of the removal of the foreign body. He was inclined to think that the least possible disturbance the better in the removal of the body, and that further operative measures should be left to a later stage when the eye is quiescent. Then, again, with regard to possible damage done by the giant magnet, Clegg pointed out that this magnet has no power of discrimination, and that the foreign body, in its passage out of the wound, or from the vitreous chamber,
may quite easily tear the ciliary body or iris or wound the lens. Large foreign bodies nearly always result in loss of the eye. Clegg then discussed the diagnosis of small bodies. His remarks on treatment are devoted, it seems to the reviewer, practically wholly to metallic foreign bodies, and, of these, to magnetic bodies. This part will therefore be referred to under the heading "Magnet." He spoke also of the various ways in which an eye may be lost, and mentioned the use of vaccines in suspected purulent uveitis.

Arnold Lawson (London).—Lawson confined his attention to the questions of the management of foreign bodies in the vitreous and the anticipation of sympathetic. The latter will be taken up under the heading "Sympathetic." Regarding vitreous foreign bodies, he considered that when these are magnetizable no difference of view arises. The chief problems arise in connection with non-magnetizable bodies. Speaking generally, it is advisable that such a body should be removed, but the difficulty and risk are great. Except copper and some others, non-magnetizable bodies are less irritating than magnetizable. Aseptic bodies may remain in the vitreous for an indefinite time, especially if other than iron (or steel) or copper. If destructive changes result from a non-magnetizable body in the vitreous, a decision will be easily come to, but, if the reaction is not great, and there is useful vision, palliative treatment and a "wait and see" attitude are justified.

Bernard Cridland (Wolverhampton).—Cridland presented statistics bearing on the prognosis, and drew certain conclusions from them. The reviewer, however, noticing that some error had crept in as regards the conclusions, got into touch with the author, and here presents the conclusions as they should be, not as they are actually set down in the Transactions.

The statistics cover a total of 43,000 accident cases in 13 years at the Wolverhampton Eye Infirmary (military cases excluded). The number of cases in which a foreign body entered and remained in the globe is 76 plus one case not yet completed. It will be noted that the percentage of penetrating bodies to total accidents is only 0.17 per cent. It will be convenient to reproduce the table of cases, in a modified way:

<table>
<thead>
<tr>
<th>Condition</th>
<th>36 cases</th>
<th>12 eyes saved</th>
<th>24 eyes lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitreous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lens</td>
<td>12</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Post. scleral wall</td>
<td>11</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Anterior chamber</td>
<td>11</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Ant. scleral wall</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Iris</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Posterior chamber</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Orbit (eye also injured)</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

76 41 35
From the foregoing statistics Cridland concludes that the situation of best prognosis is the anterior portion of the eye, i.e., in the anterior or posterior chambers, iris or lens, and that of these the lens is the worst. The second best situation is the posterior scleral wall, with a percentage of 36.27 eyes saved. The worst situation is the vitreous, with a percentage of 33.3 eyes saved. To leave the fragment in the vitreous is, in Cridland's opinion, always disastrous; in the posterior scleral wall it is less dangerous. Speaking generally, unless a fragment is either in the posterior scleral wall or in the lens, it must be extracted at almost any cost, or the eye is lost.

Hern (Darlington) had watched cases where glass or stone was lodged in the vitreous for twenty years. The following sentence does not, as it stands, seem quite compatible with Hern's previous statement (p. 132) that glass and stone were the two substances he was most inclined to leave in the eye, namely, "But if it were iron or a non-magnetizable body, and particularly if it were copper, he felt certain that the eye would go wrong; not only would the sight be lost, but the eye would be a menace to the other one." Perhaps the author here intended to confine the statement to non-magnetizable metallic bodies, for immediately afterwards he said, "in such cases his practice was to try to locate the body and make an incision as near as he could to it, and, at all hazards, get it out." If this applied to glass or stone it would be a contradiction of the previous statement. Hern agreed with some previous speakers that the foreign body should be removed as soon as the case was seen.

John Rowan (Glasgow) had, like Hern, observed stone lying harmlessly in the eye for years.

George Mackay (Edinburgh) emphasized the importance of early treatment. Fibrin or leucocytes soon gathered round a foreign body. He had seen, as also doubtless had others, cases in which a magnetizable body, in the moment of extraction, left its mantle of exudate as a floating opacity in the vitreous.

Whitehead, in his reply, said he agreed with Craig and others in laying much importance on immediate treatment. He regarded the first twelve hours after the accident as vital, because after that there was a likelihood of incarceration taking place, or at least the throwing out of lymph around the foreign body.

II.—Localization

Whitehead, in his opening paper referred to the subject of localization of the foreign body, with special reference to those which are magnetic. In some cases the body can be seen by direct inspection, in others the localization is assisted by noting the point of penetration, and, where present, the corresponding wound of the iris or lens. Where the penetration has been behind the lens, the
body can sometimes be seen ophthalmoscopically. A magnetic needle working on the principle of a galvanometer may be used to detect the presence of a small magnetic foreign body. (No further reference to the sideroscope was made by this or any of the other speakers.—E. T.). Localization by X-rays is the most valuable method of all. (Whitehead, assuming that J. Mackenzie Davidson would speak, left the discussion of X-rays to him. Unfortunately, Davidson does not seem to have taken part in the discussion.) The telephone probe would not be of much assistance in the eyeball itself, but in the orbit might be of great value.

Stephen Mayou (London) at a later stage of the discussion referred to a combination of the magnet with the telephone probe (see under "Magnet.")

Parsons in his opening paper, said that the surest test, skiagraphy, had severe limitations, because relatively few substances are opaque to X-rays. Yet the great majority of intra-ocular foreign bodies give a good shadow because the great majority are metallic. Glass is not usually visible unless it be lead glass. Accurate localization by X-rays is essential, and the only accurate method of which Parsons had had experience is that of J. Mackenzie Davidson.

"When it is remembered that accuracy of localization of the order of 1 mm. is essential, and that inaccuracy of this amount may lead to the needless sacrifice of an eye, it will be recognized how culpable any carelessness in this respect is. . . . An ordinary X-ray photograph may demonstrate the presence of a foreign body, but it is practically useless for any but a very gross type of localization."

Craig regarded accurate localization as one of the most important items of treatment of foreign bodies in the vitreous, and it was his opinion that unless the localization of a foreign body by X-rays could be secured without much delay, the patient would have a much better chance, as regards ultimate prognosis, by extraction of the body being performed quickly without this, than by waiting any length of time for X-ray localization to be done. (Craig did not mention the length of time he would wait for X-rays.)

E. Treacher Collins (London), who did not always wait for localization, mentioned the important point that a very small opaque foreign body might fail to be visible to X-rays. The smallest body he had seen recognised by X-rays was slightly under 1 mm. in diameter, but he thought small metallic particles of less size might be implanted and escape detection.

Gray Clegg spoke in a similar sense to Collins. While a radiogram with correct localization would help considerably, he had found, in several instances, that the radiogram was negative, even when, by other means, the presence of a foreign body was definitely determined.
Finzi (London) entered at some length into the details of Mackenzie Davidson localization. The localization of a body in three planes is a very difficult matter. Whatever method of localization is used, it is advisable to make a preliminary radiograph of the head in the anterior and in the lateral positions, and this applies particularly to war wounds where there may be more than one foreign body. If the shadow can be observed on the screen, it is advisable to see if it moves with the eye, but it must be noted that if it is in the optic nerve it will move with the eye, and if in certain other parts of the orbit it will move, but not to the same extent as the eye. The higher the atomic weight of the substance the easier will it be to detect. Glass can be seen even in very small fragments if it is lead glass. Large fragments of soda glass can, small fragments cannot, be seen. Gravel may or may not be detected, as it stands pretty much on a level with soda glass, but is rather more easily seen. Bits of wood cannot be detected.

III.—The Magnet. IV.—The Route Selected.

Whitehead, in introducing the discussion, definitely brought up the question of the kind of magnet, i.e., giant or hand magnet. Personally, Whitehead uses a very powerful giant magnet. It is so arranged that it can be brought to the patient at different angles. In order to avoid involuntary movements of the patient he frequently employs a general anaesthetic. (The question of general anaesthesia seems hardly to have been touched on in the course of the discussion.—E.T.). This magnet was controlled by the operator through a foot switch, and Whitehead prefers this control. (This is very much insisted on by Haab.—E.T.).

As to the very debateable point of the route to be selected, the author's statement may be quoted: "If the steel is in the vitreous, in most cases I prefer to make a conjunctival flap, puncture the sclerotic behind the ciliary region by a Graefe's knife, and insert the point of the giant magnet, keeping the current on as it is withdrawn. In this way I am satisfied that better results are obtained."

Hill Griffith (Manchester) also employed the giant magnet, but, in opposition to Whitehead, he thought that when using this magnet one should always bring the steel fragment through the circumlental space, and so avoid damage. Since using a giant magnet he had never made a scleral incision if he could avoid doing so, as there was danger of detachment of the retina.

Craig was in the habit of employing both magnets, namely, the smaller Sweet magnet and the Haab magnet. A beginning was usually made with the smaller magnet, and always when the foreign body was visible. In the first place, one could better control the direction of the pull: and, in the second place, the feebler and slower action of the smaller magnet secured a better
orientation of the fragment. It was then inclined to come to
the wound end-on instead of broadside-on as it would with a
bigger magnet. Sometimes he alternated the two magnets.
Craig regarded the intra-ocular introduction of the point of the
magnet as a last resort, although he could not say that he had
seen any untoward consequences attributable to that method.

E. Treacher Collins favoured the introduction of the small magnet
point though an incision in the sclerotic, whenever he was able
to obtain exact localization by the Mackenzie Davidson method.
Under such circumstances of localization the method was attended
by excellent results. But he did not always wait for localization,
and in these circumstances drew the foreign body into the anterior
chamber with the giant magnet. Collins is then reported to have said:
“When the foreign body had been drawn into the anterior chamber
there was a practical point connected with its removal to which he
wished to call attention. A foreign body in the anterior chamber
generally dropped to the lower part, and lay in the angle under-
neath the overhanging corneo-scleral margin. If an incision was
made opposite the position of the foreign body it often caught
under this overhanging sclero-corneal edge, and in attempting to
remove it the iris prolapsed and had to be cut off. It was
better, he thought, to make an incision with a keratome through
the cornea on the opposite side to the foreign body, and introduce
through the wound a spud which had been touched with a
Haab’s magnet, so as to magnetize it, then to draw the foreign
body across the anterior chamber. In this way a foreign body
could generally be removed without the occurrence of prolapse of
the iris.”

Gray Clegg used both types of magnet according to circumstances,
the hand magnet when the foreign body was in, or had been brought
into, the anterior chamber with the giant magnet. Small bodies in
the vitreous were capable of passing round the periphery of the lens,
and through the suspensory ligament into the posterior chamber,
and even actually into the anterior chamber, although they often got
entangled in the iris. In a proportion of cases Clegg made his section
above and passed in the bent or curved armature of the hand magnet.
Sometimes a body could be freed below, but got entangled in iris tissue
above, so that an iridectomy had to be done. If the foreign body
catches under the posterior lip of the incision either the hand magnet
or the giant can be used to draw it on to the free surface of the iris.
For a deeply-seated body it is sometimes best to enlarge the original
wound. Large wounds of the sclera may be sutured with the finest
silk and do well, even though the silk is left embedded beneath
conjunctiva. The conjunctiva should be sutured over the scleral
opening. Clegg emphasized the necessity of freeing an incarcerated
iris from the corneal wound. In making a peripheral section for
the removal of a foreign body Clegg preferred the use of Graefe's knife to that of the keratome because the latter made a smaller internal section.

Clegg's views on the subject of removal through a surgical scleral incision seem to be, at least to some extent, in opposition to those of Collins and others (q.v.) These views are so strongly expressed that only an actual quotation will suffice. "Formerly, that is, fifteen or twenty years ago, it was the rule to make a radial incision in the sclera far back, introduce the hand magnet, and if the foreign body came away, well; but if not, removal of the globe or its contents was resorted to . . . But nowadays I consider such a procedure absolutely bad surgery; for the view that the persistent presence of a foreign body was a certain means of starting sympathetic disease in the other eye has been exploded, and the method adopted was too drastic to take, for in most cases complications arose, such as loss of vitreous, and later separation of the retina from shrinkage of the scar tissue, chronic or acute uveitis, and the eye was lost, not so much from the accident as from the operative treatment. My own practice is to leave such cases (i.e., where the foreign body does not come away by Clegg's usual procedure,—E.T.) alone, and merely watch events. Even if marked siderosis is present, in my opinion, sympathetic disease is not likely to be set up unless the injured eye becomes inflamed and tender and the tension becomes minus." It is difficult to state that Clegg is referring to precisely the same cases as Collins and others, because Collins refers to localized bodies and Clegg to those in which localization has failed, but, at any rate, there seems to be marked divergence of view regarding removal by scleral incision, and the originals may be referred to by those particularly interested in the subject.

Lastly, reference has been made in parenthesis to Clegg's usual method where a foreign body is not brought forward on the day of the accident by the giant magnet. This method is to repeat the application of the magnet several times at intervals of a day or so.

Stephen Mayou (London) employs a combination of the magnet with the telephone probe. The telephone probe is tapped into the end of the magnet near the point before the latter is introduced into the eye. With this device one can hear the smallest foreign body hit the magnet when it comes into contact with it in the eye. The magnet should be inserted with current turned off, and when it is switched on, the foreign body can be heard making contact with the magnet.

Cridland said that he was not possessed, in the meantime, of a very powerful magnet. He used the Hirschberg magnet. With the exception of cases in which the body lay in the anterior chamber and iris, he favoured the introduction of the point within the globe, either through the original wound, enlarged if necessary, or through an opening in the sclera, avoiding the ciliary region, and in the
closest proximity to the foreign body or its suspected position. He did not hesitate to introduce the point freely into the vitreous, even several times if necessary. He could point to successful results even after having introduced the point six or seven times into the vitreous.

George Mackay preferred the giant magnet provided it is not of the fixed type. For small particles he employed the circumlental route, but for large fragments in the vitreous he made a scleral incision. Mackay insisted on the advisability of making a large enough incision. If the foreign body came broadside on, the lips of the wound might require to be separated.

Rowan preferred the hand magnet where possible, as the movements of the foreign body caused by the large magnet often seriously injured the eye.

Whitehead, in his reply, considered that with a very powerful magnet withdrawal by a posterior incision disturbed the vitreous least. His magnet was 50 per cent. stronger than any Haab magnet which had been made before.

Summary.—The reviewer concludes that in this discussion Clegg is the principal opponent of the scleral route where the sclera has not already been opened by the foreign body, but that most other surgeons who took part in the discussion are content to get at the foreign body in this manner if necessary, or even by preference.

V.—Siderosis.

Whitehead.—"A piece of steel or iron if left in the eye will sooner or later set up the pigmentary, inflammatory, and degenerative changes known as siderosis bulbi."

Parsons, after referring to the well-known appearances of siderosis, both gross and microscopic, said that the chemistry of this condition is not yet fully understood. E. von Hippel says that the iron is dissolved by the carbon dioxide of the tissues and is fixed by cells which have a specific affinity for the metal; it then becomes oxidized. It has also been suggested that the iron is dissolved by acid phosphates in the intra-ocular fluid, or that iron may enter into solution in organic form as an albuminate or in combination with an organic acid. The brown precipitation in the tissues is almost certainly produced by oxidation, but it is not a simple oxide or hydroxide, as it is only very slightly soluble in oxalic acid (McMullen). The characteristic ring of brown spots under the lens capsule is caused by deposition of iron in circumscribed aggregations of newly proliferated capsular epithelium. Leber showed experimentally that the introduction of a particle of iron into the vitreous causes extreme degeneration of the retina. Peculiar large granular cells are found which are derived for the most part from the retinal pigment epithelium.
E. Treacher Collins mentioned a case which seemed to show that siderosis might have been caused by the presence of a foreign body in the eye four months before it was removed, and had caused siderosis. Two years later all discolouration of the iris had passed away.

Clegg had not much to say on this subject, but referred to his article "Siderosis" in the Ophthalmoscope for 1915. He implied, however, that if the iron body is removed after siderosis has taken place, the latter may disappear and the eye do well. Typical siderosis may be preceded by inflammatory changes in the choroid.

VI.—Sympathetic Ophthalmia.

Whitehead.—"The onset of sympathetic irido-cyclitis secondary to the retention of a foreign body in the exciting eye is not common in the experience of my hospital."

Parsons.—The remarks of this speaker may be summarized as follows.—The theory which best accounts for sympathetic ophthalmia is the metastatic theory, the transmission of a specific organism, as yet unidentified, by the blood-stream. The site and nature of the wound are potent factors and not the mere retention of a foreign body. A sterile foreign body does not itself cause sympathetic, but secondary infection may do so. Any wound involving incarceration of ciliary body or iris or capsule is dangerous because (1) it keeps the uveal tract in a state of constant irritation and hyperaemia, and (2) healing of the wound is impaired with consequent liability to secondary infection. The site and nature of the wound are universally recognized factors in so far as they facilitate access of the materies morbi (whatever it may prove to be) to the blood-stream. "The question of treatment, and therewith of prognosis therefore depends upon the methods of dealing with the irido-cyclitis. If the incarcerated structures can be effectually liberated there is a good chance of the eye becoming quiet, in which case danger is usually at an end. Often, however, this problem presents insuperable difficulties, particularly in the case of wounds involving the lens in children, who are themselves, in my opinion, specially prone to sympathetic ophthalmia. I do not think that the mere retention of a sterile foreign body, whatever its nature, is of any importance at all so far as sympathetic ophthalmia is concerned."

Parsons stated that, according to Leber, sympathetic disease is less likely to follow copper foreign bodies than others owing to the intense reaction. Lead becomes coated with carbonate and in 22 cases collected by Tornatola sympathetic was never caused. Doyne regarded fragments of china as specially conducive to sympathetic.

Hill Griffith agreed with Parsons that the mere presence of a
foreign body was not a cause of sympathetic ophthalmia. He had himself arrived at the same conclusion.

Craig remarked that some means was wanted whereby one could know when sympathetic was likely to occur. A great many eyes, which were now sacrificed on account of the risk of sympathetic, would be saved, and a great advance be made.

E. Treacher Collins had been educated to believe that if he could not get a foreign body out of an eye, the eye should be excised. Experience had taught him otherwise; if an aseptic foreign body became implanted in an eye and was chemically inert, it caused no disturbance apart from the wound of entry. When sympathetic trouble arose it was connected with the nature or infection of the wound.

Clegg stated that sympathetic did not occur among his (130) cases. Nor did he consider sympathetic likely unless an eye became inflamed and tender and the tension minus.

Arnold Lawson practically replied to the desire expressed by Craig for "some means of estimating what were the chances of the supervention of sympathetic trouble," in an important series of paragraphs which seem to demand textual quotation:

"We are in a much better position to judge of the danger than we were some years ago, and there are at least four great warning signs which will notify the surgeon that he is taking undue risks.

(1) Protrated and intractable cyclitis or general uveitis which goes on for week after week in spite of treatment.

(2) The gradual supervention of an increasing lowering of the intra-ocular tension which is always accompanied by progressive failure of sight.

(3) Continual photophobia and sympathetic neuroses affecting the other eye.

(4) The condition of the blood count."

"Perhaps the most important of these signs is the increasing lowering of the intra-ocular tension. It is the most unfavourable sign we can have as regards the vision, and when once the eye, after penetrating injury with a foreign body, has become markedly minus in tension, and there is a good seeing eye on the other side, there can be no doubt, I think, that the most prudent course is to remove it"... "The time when an eye becomes so dangerous as to warrant its removal is an indeterminate one, and every case must be judged on its own merits. It is in such cases that the blood-count, as initiated by Mr. S. H. Browning, proves of enormous value. The advent of a large or considerable increase in large mononuclear cells must, I think, be held to show that the safety limit has been passed, and therefore in every case of difficulty a close watch should be kept on the blood-count, and the eye removed at once if significant alterations present themselves."

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Hern believed that there were two kinds of sympathetic trouble met with in practice. One was septic, and the other was some peculiar non-toleration of the eye to the presence of a foreign body.

Ormond (London) said that until recently he was able to say that he had not seen a case of sympathetic ophthalmia arising out of the war, but he had recently had one.

Whitehead, in his reply, said that the remark of Collins that the presence of a foreign body was of practically no account, and that the wound of entrance was the point of danger, was a strong argument in favour of removal by posterior incision. If the surgeon increased the danger by making another wound in front, there was a greater risk of sympathetic ophthalmia by the production of partial incarceration of the iris. A small linear incision, after turning back a conjunctival flap behind the ciliary processes, caused no inconvenience. He had had frequent opportunities of inspecting with the ophthalmoscope the scar he had made, and it caused no subsequent interference with vision.

VII.—Peculiarities of Military Cases

Whitehead voiced what turned out to be the opinion of others, that military cases were disappointing. In a large proportion of penetrating injuries the eye had been excised in France with removal of the foreign body at the same time. In some of these cases a persistent sinus existed, fragments of shell being left in the orbit. Such foreign bodies in the eye were rarely magnetic, e.g., copper or brass, and set up conditions calling for enucleation. Minute fragments of sand or stone set up traumatic cataract, but the removal of such a cataract was not followed by improvement in vision, since the vitreous was usually more or less opaque and the retina often detached. Operative interference was apt to light up a chronic irido-cyclitis and the eyeball had to be enucleated. When the orbit was penetrated, but not the eyeball, vision might be unimpaired, but more usually there was an intra-ocular haemorrhage or rupture of the choroid or detachment of the retina.

Hill Griffith agreed with Whitehead that in military cases the proportion of success is not nearly so high as in civil cases. Manganese steel is not magnetic.

E. Treacher Collins had seen three cases of war injury in which there was only one wound of entrance but several foreign bodies in the eye, as shown by radiography. He believed these bodies were pieces of lead which broke up in the eye.

Ormond said that military cases were usually only seen in English base hospitals after about fourteen days. By the time localization had been obtained generally another week had elapsed, so that at the end of three weeks the surgeon was face to face with a man who had, in one or both eyes, one or several foreign bodies.
Under such circumstances, the eyes being quiet and the vision fair, should an attempt at removal of the foreign bodies be made or not? Ormond's practice up to the present had been that if there were no inflammatory signs in the eye, and if there was reading vision or even 6/24, he left the eye alone. He was much influenced by several cases in which the foreign body had been removed in France and the patient sent home afterwards. In these the eye was useless for visual purposes. That being so he was not inclined to allow a man to risk losing the sight he might possess. Probably ophthalmic surgeons in England did not see the good results.

Ernest Clarke (London) said that his experience during the war had been that small foreign metallic bodies entering the eye did much less harm than was expected, either at the time or later. One explanation appeared to be that they are strictly aseptic, rendered so by the high temperature, in some cases from the explosive bomb they had left, and, in the case of bullets by the bullet striking some hard substance before being shattered.

VIII.—Effect of the Workmen’s Compensation Act

R. J. Hamilton (Liverpool) spoke of the moral point of view. Since the passing of this Act, men had been coming to the hospital with eye injuries and staying eighteen months, receiving all the time club money and perhaps half wages. The men would probably become "slackers." Would not such men (i.e., where the injured eye has been saved, but is of little practical use) have been better workmen if their one eye injured had been removed straight away?

Mackay, as an ophthalmic medical referee under the Act, said he had had considerable experience of the neurasthenic cases referred to by Hamilton. If he was satisfied that, to the best of his judgment, the injury was healed, he advised, with some firmness, a return to work, and such a reduction of compensation as would encourage the workman to do his best to earn something for himself.

Ernest Thomson.

II.—PRIMARY PROGRESSIVE CALCAREOUS DEGENERATION OF THE CORNEA


Axenfeld describes a case of primary calcareous deposit in both corneæ of a man of 34, which had gradually increased from the
appearance of a small bright spot in the right eye in the sixth year to a complete ring. At intervals of a few weeks the eyes became red, but there was no marked inflammation. His general health was and always had been good. When seen by Axenfeld the conjunctivæ of both eyes were moderately inflamed. Both cornæ showed a normal area roughly corresponding to the size of the pupil, which area was surrounded by a white calcareous glittering ring reaching on the temporal and nasal sides close to the limbus, but separated from it by a narrow transparent band. Above and below, the limits of the deposit were not so sharply defined, and it did not extend so near the limbus. Towards the centre of the cornea the edge was less sharply defined. The surface was quite smooth and the epithelium was intact. On close examination with the lens the central area showed fine lattice-like opacities deep in the substance. The condition was rather more advanced in the right eye. Vision right, with correction, 6/12; left, with correction, 6/8. Two small peripheral pieces were removed for examination from the right cornea. Treatment, which was without result, consisted in the use of baths of hot 5 per cent. solution of ammonium tartrate, as suggested by zur Nedden.

Microscopical examination showed numerous small highly refractive particles without definite shape, soluble in sulphuric acid, from which solution typical calcareous crystals could be obtained. The epithelium was practically unaltered except where the calcareous deposit had reached it and caused some irregularity and thinning of its layers. This was only the case near the limbus where Bowman’s membrane had been destroyed. In contrast to the appearances met with in band keratitis the deposit of calcareous material was chiefly in the parenchyma of the cornea and there was no microscopical evidence of any antecedent inflammation. Microchemical reaction with acids showed no effervescence and, therefore, the deposit seems to have been phosphate and not carbonate of calcium.

Axenfeld groups the progressive degenerations of the cornea into four:—

1. The chronic degenerations of a hyaline type (clump-shaped, Groenouw; lattice-like, Haab, Dimmer; familial, Fleischer).
2. Progressive degeneration from deposit of uric acid salts (Uhthoff).
3. Progressive fatty degeneration (Tertsch).
4. The degeneration described in this paper as progressive interstitial calcareous deposition (Axenfeld).

E. E. H.