somewhat enlarged, and the piece of metal removed after some manipulation with the small magnet. Size of F.B. 15×5 mm.

Three days later the anterior chamber was reformed and the blood for the most part absorbed, but the iris was entangled in the wound in its whole length.

On November 11th the eye was still injected and irritable; the iris was entangled in the wound; there was bare perception of light, and the projection was not good. There was no keratitis punctata. The tension of the eye was normal.

Considering the probable extensive damage by the very large piece of metal it was not considered advisable to make any further attempt to save the eye. Accordingly the contents of the sclerotic were eviscerated and a glass globe was inserted. He was discharged on November 21st.

CASE VII.—C.G., aged 25, was admitted two days after the penetration of a piece of steel into his left eye. He had much conjunctival discharge; the cornea was hazy, and there was a small central wound. There was marked iritis. The foreign body was removed on the same day by Haab's magnet by way of the original wound. On the following day, the inflammation having become more acute, the edges of the wound were touched with the galvano-cautery. The eye appeared likely to become a source of danger to its fellow and Mules's operation was accordingly performed a week after the date of injury.

Size of F.B. $= 3.5 \text{ mm.} \times 3 \text{ mm.} \times 1.5 \text{ mm.}$

CASE VIII.—Charles S., aged 30, was struck in the left eye by a chip of steel from the face of a hammer fourteen days before coming to the hospital. When seen there was much conjunctival injection. In the upper and outer quadrant of the corneo-scleral margin was a wound in which the iris was entangled. The lens was clear. There was much hæmorrhage into the vitreous. V.L. $= \frac{5}{6}$.

At the outer canthus beneath the conjunctiva a small swelling could be seen. The skiagraph which was taken localised the foreign body in the region of the swelling about 6 mm. deep. On the day after his admission, May 12th, 1900, Haab's magnet was applied to the globe without causing any pain; when applied to the outer canthus the patient experienced pain at once, and the conjunctiva bulged forward. The conjunctiva was divided over the region of the swelling, and extraction with the small magnet was attempted without success. On again applying Haab's magnet the foreign body appeared between the lips of the conjunctival wound and was extracted with forceps.

He was discharged from the hospital on May 21st, V.L. $= \frac{5}{6}$, when the condition was: Fundus obscured by vitreous hæmorrhages; iris still somewhat adherent to the corneal wound. The patient was seen on February 23rd, 1901, when V. was found to be $\frac{5}{6}$ partly. There was a large scar in the outermost periphery of the fundus. In this case the foreign body must have passed through the corneo-scleral ring, the ciliary body, the vitreous and the sclerotic, the scar in which is still evident. Size of F.B. $= 8.5 \text{ mm.} \times 5.5 \text{ mm.} \times 3 \text{ mm.}$

CASE IX.—F.P., aged 20, was struck in the right eye by a piece of steel on April 2nd; he came to the hospital on the following day. There was slight conjunctival injection; the iris was prolapsed through the upper part of a wound in the cornea; the lens was opaque; the pupil was dilated with atropine, and Haab's magnet was applied. Pain was at once experienced, and the foreign body appeared in the middle of the anterior chamber, having apparently travelled up from the lower part of the vitreous. On breaking the circuit the foreign body dropped into the lowest part of the anterior chamber. Haab's magnet was again applied, and the foreign body was drawn out from the original wound. A small prolapse of iris was cut off. Some lens matter and a bead of vitreous escaped during the exit of the foreign body. On the following day a hypopyon was found to be present; this disappeared under treatment by dry heat.

Five days after the operation there was intense chemosis of the conjunctiva; the anterior chamber contained turbid fluid; the tension of the globe was increased. A curette evacuation of broken up lens matter and lymph was performed, and the anterior chamber was washed out with saline solution. In spite of this treatment the dangerous inflammatory condition persisted, and it was considered advisable to remove the eye; excision was accordingly performed.

The above cases may be epitomised as follows:

CASE I.—The lens was opaque previous to operation; it has now entirely absorbed. A correcting sphere brings the vision up to $\frac{5}{6}$.

CASE II.—There are anterior and posterior capsular opacities, which were present previous to operation. They do not appear to be extending. V. $= \frac{5}{6}$. It is to be noted that there was considerable inflammation, iritis, and hypopyon at the time of operation. The foreign body was drawn through the zonule without further injury to the lens.

CASE III.—The lens, which was wounded in the withdrawal of the foreign body, has absorbed, leaving a capsular membrane. V. after correction $= \frac{5}{6}$. The projection is good.

CASE IV.—The lens, which was wounded previous to operation, has become absorbed, leaving a thickened capsule. V. after correction $= \frac{5}{6}$. Projection perfect.

In the two last-mentioned cases it will be a matter for future consideration as to whether or not dissection of the capsule is attempted. In one of them, at any rate, this does not appear to be contraindicated. In the other case the capsule is thick and calcareous, and is adherent to the iris. Here we should not advise further operation.

CASE V.—The lens was opaque previous to operation. It has absorbed leaving a dense capsular membrane. V. with a correcting glass $= \frac{5}{6}$. The projection was perfect. A good central opening in the capsule was obtained by needling

some weeks afterwards, and vision with a correcting glass was eventually $\frac{5}{6}$.

CASES VI AND VII.—In both these cases the eyes were in a state of acute inflammation at the time of operation. The injured eyes were excised a few days after the foreign bodies were extracted.

CASE VIII.—This case differs from the others in that the foreign body was removed from a position external to the globe after having passed through cornea, iris, vitreous, and sclerotic. V. at present time is $\frac{5}{6}$.

CASE IX.—Considerable injury was inflicted upon the eye in this case during the passage of the foreign body through the vitreous and lens into the anterior chamber; and, again, the extraction through the corneal wound caused considerable damage to iris and cornea. It is not to be wondered at, therefore, that the resulting inflammatory condition demanded excision.

A few general conclusions that we have arrived at as to the extraction of foreign bodies may be mentioned as follows:

1. When the patient is brought up to the magnet it is the rule for severe pain to be experienced by him if a magnetisable particle is present in the globe. Haab's magnet is therefore of valuable diagnostic service in determining the presence or absence of a magnetisable particle.

2. Localisation by the x rays is extremely important. By their means it is possible sometimes to avoid injury to a clear lens in the extraction of a foreign body, and entanglement in the iris can be avoided if its precise situation is known. Nevertheless, if some delay is unavoidable before the x rays can be applied, we advise in certain cases immediate extraction of the foreign body by Haab's magnet without precise localisation; for example (1) in which there is considerable inflammation; (2) in which there is a recent traumatic cataract. In each of these cases there is considerable danger in delay.

3. If there is a recent wound we attempt to remove the foreign body through it, using Haab's magnet alone. If this wound has firmly healed it is necessary to make an opening for its exit. This may be either corneal, in which case the foreign body is withdrawn by Haab's magnet; or peripheral, in which case we usually employ the small magnet for the removal of the foreign body from the anterior chamber after it has been brought forward by Haab's magnet. The latter method is the one we generally adopt.

4. In all cases it is most essential that entanglement of the particle in the iris and ciliary body should be avoided. By bringing the patient up to the magnet gradually from a distance, and by increasing the strength of the current up to the maximum slowly, this is to a certain extent guarded against. The idea of this manoeuvre is to prevent the particle from rushing forwards from its posterior position and burying itself in the iris.

THE RELATION OF GLAUCOMA TO THROMBOSIS OF RETINAL VEINS, WITH NOTES OF CASES.

By E. HARRIES JONES, M.B., C.M. EDIN., M.R.C.S. ENG.,
L.R.C.P. LOND.,

Honorary Ophthalmic Surgeon, Northampton General Infirmary; late
Resident Surgical Officer, Birmingham and Midland Eye Hospital.

THE relation of glaucoma to diseases of the retinal vessels has long been a subject of discussion to ophthalmologists. Several papers have appeared from time to time recording cases showing this relation, notably that of Wehrli,¹ which deals almost entirely with glaucoma following albuminuric retinitis. The following notes illustrate the fact that glaucoma may occur as a sequel to unilateral thrombosis of the central retinal vein, associated with arterio-sclerosis, but without albuminuric retinitis. Curiously enough, Michel, who was one of the first to describe the appearances due to thrombosis, stated "that the intraocular tension during the course of this affection is never increased." Glaucoma, however, is a well-known, though rare, complication of so-called hæmorrhagic retinitis.

CASE I.—G.W., aged 50, copper dresser, admitted as out-patient to Birmingham Eye Hospital, August 27th, 1900. Complaint: Gradual loss of sight of left eye since first week in August, 1900. No history of sudden onset. On examination fundus presented typical picture of thrombosis of

central vein, disc hyperæmic, veins tortuous, stream in them broken up. Scattered hæmorrhages of dark colour throughout fundus. Right eye always weak, disc slightly pale. R.V. $\frac{1}{2}$, not improved by glasses. L.V. Hand movements. Urine, specific gravity 1020, no albumen, blood, or sugar; no cardiac hypertrophy, very slight thickening of radial arterial wall. Dark glasses were ordered, and a mixture of potassium iodide and iron prescribed. The patient made periodical visits to the hospital, but very little change occurred in the fundus.

On October 21st, however (that is about six weeks after onset), it was noted that the left eye was in a condition of acute glaucoma, with tension +2, cornea very hazy, very marked conjunctival and ciliary injection, small hæmorrhages on surface and in the substance of the iris, fundus not visible, vision—perception of light only. Admitted as in-patient same day, and kept under eserine, but no improvement taking place, and the eye being painful, excision was advised, but this the patient refused to have done. He was discharged November 5th, being then fairly free from pain. On March 25th, 1901, the eye was nearly quiet, pupil semi-dilated, absolute glaucoma, no perception of light, lens becoming opaque. Tension markedly raised.

CASE II.—Mrs. M. A. P., aged 66, came as out-patient August 31st, 1900. Complaint: Sudden loss of sight of left eye the day before. On examination marked thrombosis of central vein was found, with some swelling of disc and oedema of retina, but no albuminuric retinitis; urine, specific gravity 1018, no albumen, blood, or sugar; very slight thickening of arterial walls. Right eye, fundus normal. R. V. $\frac{1}{2}$, L. V. hand movements only. She was treated as above, and on October 16th she also developed acute glaucoma in left eye. Tension +1, much dilatation of episcleral veins and a few hæmorrhages on the iris. V = perception of light only. The patient was admitted and treated in hospital for about a month, but no improvement took place; the eye gradually quieted down but no vision remained.

CASE III.—T. D., aged 59, came as out-patient August 14th, 1900. Complaint: Sudden failure of sight of left eye ten days ago. Ophthalmoscopic examination revealed marked thrombosis of central vein, swollen disc, hæmorrhages, especially abundant near disc, around which were a few white areas (?) resulting from hæmorrhages. There was no trace of macular degeneration or any other appearance of albuminuric retinitis. Right eye: Retinal veins dilated, and in places crossed and partly obstructed by rigid arteries; disc healthy, full vision; urine, specific gravity 1015, albumen a trace, no sugar; arterial walls thickened and some hypertrophy of left heart. The usual remedies were administered until October 24th, 1900, when he was admitted into hospital with left acute glaucoma (with a history of onset three days previously), the pupil being semidilated and cornea very hazy. Tension +1, hæmorrhages on surface of iris very marked. L.V. perception of sight. Practically no improvement took place under eserine, and he was discharged from hospital on December 10th. On March 19th, 1901, he complained of increasing dimness in right eye, and on examination the disc was found to be cupped, the field being very contracted on the nasal side, R.V. = $\frac{1}{2}$. He was at once admitted and iridectomy was performed. When discharged a fortnight later R.V. was $\frac{1}{2}$ c. -2 cyl. ax. 90°. L.V. = Perception of light.

CASE IV.—Mrs. C. P., aged 59, came to hospital on January 19th, 1895, complaining of dimness of right eye, which had lasted a week. Examination of fundus disclosed fairly marked thrombosis of retinal vein, with some thickening of retinal arteries. Urine: Specific gravity 1010, no albumen, blood, or sugar. R. V. = $\frac{1}{2}$ c. +2.

June 15th, 1901.—R. V. = $\frac{1}{2}$ c. +2, hæmorrhages nearly all cleared up. She did not come to hospital again until October 30th of same year, when it was noticed that the right disc was cupped. R.V. = Perception of light only; no hæmorrhages in fundus. On November 16th right iridectomy was performed. The left eye up to this time had remained good, and L. V. was $\frac{1}{2}$ c. +2.5. She came again to the hospital in March, 1896, complaining of dimness in left eye. L. V. $\frac{1}{2}$ c. +2.5 disc cupped slightly. Left iridectomy was done at once, and this apparently checked the glaucoma, for her vision on July 31st, 1900, was $\frac{1}{2}$ c. +2.5, cyl. ax. 180°.

It will be observed that the glaucoma in the last case was distinctly chronic, whereas in the others it was acute, and that in the first three cases glaucoma followed the retinal condition in about six weeks, but did not appear in Case IV for over nine months. The occurrence of glaucoma in the eye unaffected with thrombosis in Cases III and IV is remarkable, suggesting a possible causal relation between the two conditions. The presence of hæmorrhages on the surface and in the substance of the iris showed that the arterio-sclerosis was not limited to the retinal vessels, but also affected the ciliary arteries, this latter circumstance, of course, being a strong contra-indication to performing iridectomy, seeing that extensive intraocular hæmorrhage is so likely to occur under these conditions.

The clinical significance of this complication in cases of thrombosis naturally lies chiefly in the direction of prognosis, which is really not at all bad in many cases of simple thrombosis, the patients often retaining some useful vision after the re-establishment of the circulation and the absorption of hæmorrhages.

The occurrence of acute glaucoma as a sequel, however, renders the prognosis extremely grave, since these cases, owing to the condition of the vessels, are such that an iridectomy does not afford much promise of success.

My thanks are due to the honorary staff of the Birmingham and Midland Eye Hospital for permission to publish notes of these cases.

REFERENCE.

¹ *Archives of Ophthalmology*, March, 1900.

REFLECTIONS ON OPHTHALMIC WORK IN
THE ARMY.

By JOHN GRIMSHAW, M.D.LOND., M.R.C.S.ENG., ETC.,
Aldershot.

It is with pleasure that I read the annotation on spectacled soldiers which appeared in the *BRITISH MEDICAL JOURNAL* of September 21st, 1901. As there are various points in it which have occupied my special attention for a considerable time under favourable conditions for examining into and forming some opinions on this important question, it may prove of interest if I describe briefly my experience, and in a general way record a few impressions on the subject of defective vision in soldiers as it has appealed to me.

For over eighteen months, as civil surgeon attached to the Cambridge Hospital, Aldershot, I have had charge of the ophthalmic work of this hospital, and, as a part of my duties connected therewith, it has fallen to my lot to examine and report upon for the medical officer in charge all cases of defective vision reporting sick at this hospital. This process includes all cases sent to hospital from the various inspection rooms in South Camp for eye examination and report. Further, I reported on all soldiers admitted into the Cambridge Hospital who were invalided home from South Africa on account of eye trouble of one kind or another. This represents only a small portion of my ophthalmic work in hospital and camp, but time does not allow me to deal with my entire ophthalmic experience here in anything like a comprehensive and exact manner.

After some time, when I fell into the routine work of the military medical system, I recognised the great importance of this subject of defective vision in its relation to voluntary enlistment, and to the efficacy of the man as a fighting unit after enlistment. For the last twelve months, therefore, I have kept complete copies of my reports, and it has been my aim to make each report minutely and accurately represent the true state of the eye examined. I worked out the refraction of each eye by retinoscopy after application of homatropine cum cocaine, and afterwards checked the results, and the ability of the soldier to answer correctly, by examination with test types and trial lenses. All other methods of routine eye examination were used by me in every case, so that I could conscientiously say, on occasion, "no cause for defective vision can be found."

It is only those, perhaps, who have like myself seen the wearying and nerve-shattering effects of the "scrimshanker's" importunity upon the responsible medical officer, who can realise the value of this moral support when appealed to in the hour of trial, "Are you sure there is nothing wrong with this man's eyes, Mr. —?"

The amount of material I have had at my disposal can be judged by the following extract: "The work carried out by the R.A.M.C. at Aldershot since the war commenced has been enormous, but it has been accomplished with remarkable success. Some idea of this can be gathered from the fact that during the year 1900 over 10,000 patients passed through the wards of the Cambridge Hospital alone, and over 3,000 of these were sick and wounded from South Africa."

I find that in the last twelve months I have written some 250 reports of the kind described on cases of defective vision for the medical officer in charge of the Cambridge Hospital. These reports, I may add, are forwarded by this officer to the principal medical officer attached to the invaliding documents of those patients whom I have recommended for discharge on account of visual disabilities.

The cases of ametropia were:

Hypermetropia + 3 D. and under (small error of + 1 disregarded)	=	34
" Over + 3 D.	=	54
Total of hypermetropia	=	88*
* Of these 88 cases 42 had more or less marked astigmatism.		
Myopia - 3 D. and under (small error of - 1 disregarded)	=	16
" Over - 3 D.	=	15
Total of myopia	=	31†
† Of these 31 cases 16 had astigmatism.		
Mixed Astigmatism	=	17
Total cases of ametropia		136
Presbyopia	=	12
Total	=	148