adequate to recognize local disease, and (3) a thorough knowledge of practical optics and refraction, the Association holds that the clause last named is all that is required for opticians. The other clauses could be carried out only as part of a medical course. The medical colleges cannot arrange special courses for such purposes, nor can they fit optometrical students into the regular courses now in existence. To institute a special college for the purpose has all the objections of creating a quasi-profession and of multiplying the difficulties now existing rather than of simplifying them. While the Association approves of a good training for opticians, such as may be obtained from technical schools and from experienced opticians, it thinks that the logical solution of the optometrist difficulty would be met by urging a more thorough course of refraction in the medical colleges. With this view we are in cordial accord, and would merely add that, in our opinion, ophthalmology should form an integral part of the final examination for medical qualification.

ABSTRACTS

I.—ANISOCORIA


Tarun has investigated the frequency and diagnostic value of inequality of the pupils, and to this end has examined records of 3,610 private patients suffering from non-inflammatory affections of the eyes. Examinations were made in a dark room with a constant source of light. The reaction of the pupil was determined with a concave mirror, used at a distance of rather more than its focal distance. Anisocoria was looked for under the same conditions with a plane mirror, at a distance of one metre from the patient. In Tarun's opinion, the daylight test should be discarded. The examination of the pupils should be made under quiet conditions, in order to exclude the psychic reflex. Two minutes should be allowed for dark adaptation. The author feels sure that on occasion Haab's cortical pupillary reflex has been mistaken for an Argyll Robertson pupil. Anisocoria was found in 19.39 per cent. of the cases examined. Normal eyes averaged 18.54 per cent., which gradually rose in diseased eyes and lesions of the nervous system until 70 per cent. was reached in the instances of Argyll Robertson pupil. Tarun is rather sceptical in believing that there is such a condition as physiological anisocoria, although Bach and
Behr think it does exist. "In view of the percentage of anisocoria in the normal eyes there must have been some condition present, eliminating a toxin, during the lifetime of the individual, acting not upon the motor supply of the sphincter muscle of the iris, but upon the sympathetic fibres to the dilator pupillae." Tarun believes that inequality of the pupils is of scanty value when the pupils are active to light, when there is merely a slight difference in size, and even in some cases when a marked difference exists. When there is a slight difference in size, together with inactivity to light, directly or consensually, it is of the utmost value in determining the site of a lesion of the cerebro-spinal axis. It is useful at times when one pupil or both pupils are not uniformly round and sluggishly active.

The communication ends with a bibliography containing thirty-three entries.

S. S.

II.—TETANUS FOLLOWING INJURY OF THE EYEBALL


The eye of a man of 21 years was perforated by an improvised arrow made of weeds pulled out of the ground and discharged from a crossbow by a boy. The patient at once pulled the missile out of the eye. When seen thirteen hours later the entrance wound was found to be limited to the cornea, and to have mangled iris tissue and lens substance protruding through it. The wound was cleansed and the shreds of iris and lens were removed. Owing to the presence of threatening symptoms, the eye was removed the same day, twenty-four hours after the injury. All went well until the afternoon of the third day following the operation, when the man complained of difficult mastication and of stiffness of the muscles of the jaw. Large doses of antitetanic serum were given intravenously and intraspinally, the orbit was exenterated, and antitetanic serum was applied locally and injected into and along the sheath of the optic nerve. The patient died on the seventh day after admission. Autopsy disclosed congestion of the lungs, acute dilatation of the heart, fatty degeneration of the liver with passive congestion of the left lobe, acute splenic tumour, cloudiness of the meninges, and oedema of the brain. No bacteriological examination appears to have been made either before or after death. The injury seems to have been limited to the eyeball.

S. S.
III.—OCULAR DISEASE OF DENTAL ORIGIN


Hardy's article is a partial review of the literature of this subject accompanied by what appears to be a fairly complete bibliography. The following remarks towards the end of the article seem worthy of transcription:

"The argument is raised that the connection between tooth and eye affections is too hypothetical and problematical, and that they are not related in cause and effect, but are coincidental. This view is based on the great prevalence of tooth affections and the relative infrequency of an associated eye disease. Yet no one disputes a syphilitic, gonorrhoeal or tuberculous iritis or keratitis. It is incumbent upon ophthalmologists to consider the teeth in our list of possible aetiological factors, but to refrain from making of this possibility a hobby to be ridden to death." These remarks seem very much to the point.

*Ernest Thomson.*

(2) Dor, L. (Lyon).—Optic neuritis due to dental infection. (Névrite optique par infection d'origine dentaire.) *La Clin. Ophtal.*, Sept. 1917.

Dor has already given expression to his views on the subject of eye disease due to dental infection. He here adds reports of two cases which he holds are of this origin, though the case histories are incomplete in so far as the result of treatment of the teeth is not mentioned. He says that certainly readers are free to think that there is a simple coincidence between ocular affections of an "indeterminate" nature and the dental affection, but that those who consider the evolution of such cases of optic neuritis before and after the extraction of the teeth will quickly be convinced of the relation of cause and effect.

*Ernest Thomson.*

(3) Dor, L. (Lyon).—Thrombosis of the retinal veins due to dental infection. (Thrombose des veines rétiniennes par infection d'origine dentaire.) *La Clin. Ophtal.*, Sept. 1917.

Dor relates the case of a soldier who had thrombosis of the central vessels of the right eye with retinal haemorrhages and amblyopia ex anopsia of the highly myopic left eye. There was neither sugar nor albumin in the urine and no sign of syphilis. The dental condition was very bad on the side corresponding to the thrombosis. Four teeth with infected roots were extracted...
from this side of the upper jaw. The case is incomplete in so far as there are no observations as to the result, but Dor himself is satisfied as to the cause of the thrombosis being purely dental.

**ERNEST THOMSON.**

### IV.—ICTERO-HAEMORRHAGIC SPIROCHAETOSIS


(1) van Schevensteen reports a case of choroido-retinitis observed during convalescence in a soldier affected with ictero-haemorrhagic spirochaetosis. The disease developed on November 17, 1916, the symptoms being of moderate severity. On December 18, 1916, the eyes were examined, and vision was found to be 1:0. As regards the left eye, there was retinal anaemia. The urine contained traces of blood and albumin, some white corpuscles, many renal cells, but no spirochaetes. 4 c.cm. of venous blood was injected into the peritoneum of a guinea-pig, and was followed by jaundice. A small number of spirochaetes were found in the animal’s liver and suprarenal capsules, but none in the kidneys. The patient was sent to his dépôt, on January 10, 1917, and sixteen days later he complained of his left eye, and albumin was found in the urine.

On March 10, 1917, R.V.=1:1. Fundus normal. L.V.=0:8. Floating bodies in vitreous. The urine contained albumin, but was free from spirochaetes. On March 23, the vision of each eye was 1:1. The right eye was free from changes, but the left showed vitreous opacities (filaments). On April 5, the patient complained of some slight disturbance of the sight of his right eye, and on examination, the vitreous was found to be somewhat cloudy. V.=1:0. L.V.=1:0. Condition of vitreous as reported. On May 23, a patch of recent choroido-retinitis was discovered in the periphery of the right fundus, and on May 30, a similar discovery was made in the left fundus. On June 25, R.V.=0:8; a few small haemorrhages were found about the diseased area in the fundus. L.V. 1:1. The area of choroido-retinitis was unaltered. The vitreous opacities had disappeared. On July 15, when the patient was discharged, the urine contained no albumin. R.V.=1:1. L.V.=1:1. There were no vitreous opacities, and the areas of choroido-retinitis were in process of resolution.
Ichthyo-Haemorrhagic Spirochaetosis

Incidentally, van Schevensteen mentions two other cases of spirochaetosis. In one, there were a couple of crises of intense neuralgia, lasting for two or three days, affecting the supra- and infra-orbital nerves on the left side, and accompanied by photophobia and moderate lacrymation. In a second, convalescent, violent pain around and in the eyes was complained of, and in one eye signs of past iritis were found on the anterior capsule of the lens. No albumin in the urine.

S. S.

(2) Weekers, L. and Firket, J. (Belgian Army).—Redness of the eye in ichtero-haemorrhagic spirochaetosis. (La rougeur oculaire dans la spirochétose icéro-hémorragique.) Arch. Méd. belges, April, 1918.

(2) It is well known that hyperaemia of the anterior segment of the eyeball is an early sign seldom absent from cases of ichtero-haemorrhagic spirochaetosis. For example, it was present in 92 per cent. of the cases examined by Weekers and Firket (see this Journal, March, 1918, p. 141). Those authors discuss that manifestation more particularly in the present communication. They note that the congestion of the conjunctiva is secondary to a more or less pronounced ciliary congestion, which betrays the localization of the causal spirochaete in the uvea. The spirochaetes have been found in the blood and the cerebro-spinal fluid, as well as in the liver and kidney, and we need not be surprised that they become fixed in so vascular a tissue as the uvea. Hyperaemia of the anterior segment of the eye, congestion of the iris, and iritis are manifestations of different degrees of inflammation of the uveal tract. The redness of the front of the eye may be discrete, but in more marked cases the parts are vividly injected and sometimes intense reactional symptoms may be observed, as photophobia, watering, redness of the eyelids, etc. When examined closely the redness is seen to involve both the conjunctival and the ciliary vascular system. Subjective symptoms, as a rule, are but slight. The patient sometimes complains of no pain, although more often he experiences a pricking sensation and moderate pain, spontaneously or on pressure. Moderate lacrymation is the rule. Traces of secretion may be found, but it is scanty and does not agglutinate the eyelids during sleep. Simple cases call for no treatment beyond the use of a cleansing lotion. In some instances hyperaemia of the anterior segment gives place to congestion of the iris, as recognized by pupillary inequality or contraction, showing that the congestion is not equally marked in the two eyes. The ocular complication may or may not coincide with an elevation of temperature. In grave cases there may be all the symptoms of iritis or even of iridocyclitis. In these forms atropin and other remedies employed in iritis should be used.

S. S.
Noff, P. and Firket, J. (Belgian Army).—Clinical observations upon one hundred cases of ictero-haemorrhagic spirochaetosis. (Observations cliniques sur cent cas de spirochète icôte-hémorragique.) Arch. Méd. belges, April, 1918.

In the course of this communication by Noff and Firket, based upon the clinical observation of 100 cases of ictero-haemorrhagic spirochaetosis, the writers incidentally allude to the accompanying eye complications. In the early stages conjunctival and ciliary redness is the rule, and the patient complains of lively pain during extended movements of the eyeball, especially upwards or to the side. When the haemorrhagic element is pronounced subconjunctival ecchymoses are common. Towards the fifth or sixth day, exceptionally on the fourth, the conjunctiva becomes jaundiced.

S. S.

V.—REMEDIES


This exhaustive paper by Cavara, extending to over 60 pages of the Klinische Monatsblätter, is too long to abstract in detail. The introduction deals with the chemical constitution of ethylhydrocuprein or optochin and with the literature. The second part deals with the bactericidal action of optochin, showing that in vitro its action is specially efficient in respect of the pneumococcus.

In the third part the action of optochin on the ocular tissues, especially the cornea, is discussed. A 1 per cent. to 2 per cent. solution may be used hourly as a drop without damaging the cornea, and the ulcer may be touched with a 2 per cent. to 5 per cent. solution. As a result of its anaesthetic action, only the first application of the 1 per cent. solution causes "a more or less strong burning," subsequent applications are practically painless. In respect to stimulating the healing of a corneal wound with loss of tissue, optochin was found to be indifferent or slightly positive. Intra-ocular pressure is uninfluenced or slightly reduced. The fifth and longest section deals with the results of treatment of ulcus serpens corneae by optochin. Fifty-five cases are recorded. Cavara used exclusively a 1 per cent. to 2 per cent. watery solution of optochin hydrochloride which was applied hourly for half to one minute on each occasion.
**Remedies**

When the deeper corneal layers are infected, it is necessary to apply the solution at very short intervals during the night also. In pneumococcal ulcers the results are always favourable.

The sixth and last section deals with the action of the solution in cases complicated by dacryocystitis. Here it was found that the condition of the lacrymal sac had no unfavourable influence on the corneal ulcer, and that the treatment of the latter by optochin caused pneumococci to disappear from the secretion of the sac.

The author concludes strongly in favour of this method of treatment of corneal ulcers which have been shown to be pneumococcal.

H. M. Traquair.


(2) Stengele has used optochin in three types of cases: those caused by pneumococci; diseases of the tear-sac; and conditions especially characterized by photophobia. Details of twenty cases are given and the author's conclusions are strongly favourable. A 1 per cent. solution used *regularly* every one to two hours was found to cure hypopyon ulcers, and a 5 per cent. solution after a few applications rapidly and permanently cured photophobia in serofulous ophthalmia. In cases with lid eczema, however, the results were not good until the lids were improved by ointments. In photophobia due to interstitial keratitis and to irritation by lime, optochin was not successful. Optochin seems hardly likely to become a popular drug as, while a 1 per cent. solution can be borne without cocain, a 5 per cent. solution is found "very unpleasant." The evidence of its usefulness brought forward in this paper is not very convincing.

H. M. Traquair.

(3) Basterra (Santa Cruz).—Therapeutic value of ethylhydrocupreine in ophthalmology. (Valor terapeutico de la etilhidrocupreina en oftalmologia.) *Archivos de Oftal. Hisp. Americ.*, December, 1917.

(3) Basterra has obtained good results in cases of serpent ulcerations with the use of ethylhydrocupreine (optochin). His conclusions are as follows: optochin is the best form of treatment we possess for pneumococcal serpent ulcer of the cornea; rapid healing with a minimum of bad after-effects follows its use. The scars which remain are finer and less dense than those left after other methods of treatment. The drug is to be employed two hourly in 2 per cent. solution; after previous cocain anaesthetisation of the cornea, until the corneal infiltration has disappeared,
and the ulcer has begun to cicatrize. Finally, to facilitate the action of the drug, the mucocele, when present, must be extirpated.

R. R. JAMES.


(4) Seidel alludes to the work of Koepp and Schanz on the treatment of tuberculous eye diseases by light therapy. The former used a Nernst lamp with Gullstrand’s apparatus, and the latter an arc lamp filtered through dark blue glass. The results obtained were satisfactory. Other authors (Rollier, Flemming, and Krusius) had obtained equal, if not better, results with direct sunlight. Seidel was led to try direct sunlight in several tuberculous eye cases and was very well satisfied with the results obtained. He quotes at some length the notes of a private case of Wagenmann’s of nodular tuberculous iritis in which, in spite of energetic use of all the ordinary methods of treatment, including tuberculin, the condition got steadily worse. After a fortnight’s light treatment the nodules had practically disappeared and the condition had improved to such an extent that the patient was discharged a fortnight later.

The method he has adopted of using sunlight consists in shielding the eye with a black card in which is pierced a hole 2 mm. in diameter through which a narrow pencil of sunlight is directed to the affected part. At first the light is allowed to act for half a minute at a time and later for two minutes. If the sun permits the treatment is given daily. In the case quoted above 15 light treatments were given. He has observed no ill-effects.

E. E. H.

VI.—THE CHOICE OF OPERATION IN GLAUCOMA

van der Hoeve, J. (Groningen, Holland).—Defects in the visual fields and operation methods in glaucoma. (Gesichtsfelddefekte und Operationsmethoden bei Glaukom.) Zeitschr. f. Augenheilk., Vol. XXXIV, Parts 4-6, 1915.

van der Hoeve has written a paper which should be studied by all ophthalmic surgeons. He shows how absolutely essential it is in all cases of glaucoma carefully to search for scotomata in the neighbourhood of the blind spot. As soon as Lagrange showed how to attain the long-desired filtering scar, sclerectomy conquered the ophthalmic world. At the present time there must be very few eye clinics which do not employ one or other of the methods in vogue for obtaining the fistulous cicatrix, and at one time it almost appeared...
that iridectomy had lost its place of honour among the glaucoma operations. The inevitable reaction has taken place, because it is now fully realised that a late infection may destroy or seriously damage the eye after sclerectomy. It is, however, as unjustifiable to place the operation first among glaucoma methods, as it is to talk of the "tragedy of sclerectomy," as T. Harrison Butler* has done in a paper in which he says that "a sword of Damocles hangs over the head of every possessor of a filtering scar." We can definitely say that sclerectomy is a valuable addition to our methods of fighting the disease.

Bjerrum's method has a great advantage over ordinary perimetry; a scotoma is projected thirty-six times its real size, instead of only six times. Bjerrum stated definitely that one of the first signs of glaucoma was the appearance of a crescentic or ring scotoma, which, starting from the blind spot, swept round the fixation spot, and ended blindly upon the horizontal meridian. Bjerrum was inclined to believe that the characteristic scotoma was present in every case of chronic glaucoma. Priestley Smith went even further, and stated that if Bjerrum's sign were absent, glaucoma could almost certainly be excluded. In Germany, although similar scotomata had been occasionally described, even before Bjerrum pointed out their significance, the sign met with scant recognition; but even in that country, late in the day, it has proved acceptable.

Bjerrum early recognized the cause of the peculiar form of the scotoma, a defect in the nerve fibres, where these bundles end at the horizontal raphé of the retina. The scotoma, therefore, must end blindly in the horizontal meridian through the fixation point. If the nerve bundle defect stretches to the periphery of the retina, a sectional defect is added to the crescentic object, and the scotoma reaches from the blind spot to the periphery. The horizontal boundary of the scotoma gives rise to Rönne's nasal step (nasale Sprung).

The commonest extension of Bjerrum's scotoma is towards the periphery, which it either reaches independently, or it merges with a peripheral limitation of the general field of vision. Some of the cases given by van der Hoeve show, however, that the extensions of the scotomata may take place in another direction, towards the fixation point. This is a much more dangerous development, for the scotoma now threatens the macula.

van der Hoeve's first case may be summarized by saying that it was one of glaucoma simplex with a blind left eye, the right eye having a normal field of vision and almost normal acuity. There was, however, a scotoma which, although at first relative, slowly became absolute; a scotoma which, starting from the blind spot,

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* Butler, T. Harrison.—The Ophthalmoscope, September, 1915.
extended in a crescent below the fixation point to the raphe of the retina. Above, a similar scotoma developed, which also slowly became absolute. The lower scotoma approached to within 1° of the fixation point. Some intervention was necessary. Miotics and sclerotomy failed to inhibit the spread of the defect. Iridectomy was rejected as too dangerous, because it is well known that it often causes an extension of the defect in the field of vision, and it is therefore customary to avoid this operation when the contraction is too near the point of fixation. Straub states that the danger zone is anything within 10° of the fixation point. In this case, therefore, there could be no question of iridectomy, and so sclerectomy was chosen. This was carried out by Elliot's method, with a very small peripheral iridectomy. During the last year the disease has not progressed, a small relative island has appeared in the absolute scotoma, and both scotomata have diminished in extent.

In the second case an eye with a fairly good peripheral field and good acuity was threatened with blindness by a central scotoma. The history of the patient shows how necessary it is regularly to watch the progress of the central scotoma. This is generally done by filling the scotoma in on a diagram. There is a scale of degrees upon Bjerrum's screen, but to use it, it is necessary always to employ the same fixation point, the centre of the scale of degrees. van der Hoeve uses a plain screen which he projects upon a diagram by means of a camera obscura, and so draws the scotoma upon a small scale. It is not clear whether the scotoma is first drawn full size upon Bjerrum's screen, and then projected upon the diagram or whether the moving object is also projected, and the scotoma drawn direct. We gather, however, that the former method is employed, but we are not told how the original is made; perhaps with white chalk upon a matt black paper.

If a Bjerrum's scotoma be not detected, there is a danger: first, that a man with good acuity and peripheral field may be lightly dismissed with miotics, until suddenly complete central blindness, rapidly followed by amaurosis, develops; and, secondly, one may imagine that the field is normal, and perform iridectomy, which, by increasing the central scotoma, destroys vision. Such cases are common in glaucoma records. Although the extension of Bjerrum's scotoma towards the blind spot is not the rule, it is probably not a rare occurrence.

In the third case a central scotoma threatened blindness to both eyes with good acuity and a peripheral field which was normal on the right side. The patient refused operation because of her good vision, and only consented to trephining when her acuity showed signs of failure.

In the fourth case the patient was blind of one eye, and despite
THE CHOICE OF OPERATION IN GLAUCOMA

anterior sclerotomy, the vision of the other eye continued to fail, and the scotoma reached within 2° of the fixation point. After trephining, the field of vision enlarged 10°.

Case V.—Mrs. V., aged 63 years, first seen on May 28, 1914, complained that she had seen badly with the left eye for three months. R.V.=6/6; fundus normal. T. 25 mm. L.V.=6/18, T. 45-50 mm. Excavation with a circumscribed depression to 11D. Left field of vision contracted on the nasal side; left Bjerrum's scotoma. June 3.—Trephined above with small iridectomy. After this, the eye remained quiet. V. =6/24; T. 12 mm. Scotoma smaller.

Case VI.—B. B., aged 55 years, first seen on July 8, 1915. Seeing badly with both eyes. The sight of the left was always less acute than the right. R.V.=6/36. T. 33 mm. L.V.=2/60. T. 33 mm. The left cornea shows maculae, the right nebula. Deeply cupped disc in right eye (5 D.). Left disc excavated to 3 D. Right field of vision contracted. Bjerrum's scotoma. August 8.—Right eye trephined. July 25.—Left eye trephined. Both trephined above with small peripheral iridectomy.

From the time these operations were performed, the eyes remained quiet. R.V.=6/24. L.V.=6/60. Field of vision of left eye as before. In the case of the left eye, although the tension was reduced to less than 10 mm., yet the glaucomatous process was not arrested. For after an ephemeral enlargement of the field of vision, it slowly contracted up to a narrow temporal strip. No other cause for the contraction of the field, as in Elliot's case,* could be discovered.

All the patients after operation showed good filtration, and the so-called "Elliot" or "Herbert sign" was always positive; that is to say, the pressure of a probe left a pit in the conjunctiva. In the author's opinion the method cannot be used as a test of good filtration.

A consideration of the foregoing cases shows that Bjerrum's scotoma may begin as a relative defect for white, and that the power of perception in such a region may gradually diminish until absolutely blind islands appear, and eventually the whole area is blind. The author has also noted that crescentic scotomata generally start from the blind spot, or are best developed there, and also that they can spread from the raphé. This latter phenomenon is not surprising if the nerve fibre lesion be caused by increased pressure upon the fibres. It is obviously not to be expected that the fibres which end near the papilla will be the first to be destroyed; it is also possible that those which end in the raphé or in the middle may be more seriously or earlier affected. The consequence will be that relative or absolute scotomata will appear which do not

directly join the blind spot. Such partial defects which do not join the blind spot appear, indeed, in other diseases, as, for example, in retino-choroiditis. The scotomata, especially recent ones, may disappear after operation. Further, the scotomata which may or may not be accompanied by peripheral contraction of the field may increase and spread towards the fixation point; this progression is not always inhibited by miotics and anterior sclerotomy, although sclerotomy may lead to improvement; and sclerectomy by Elliot’s method, with a small peripheral iridectomy, has no greater dangers in the case of large scotomata quite close to the macula or in well marked peripheral contractions.

Conclusions

1. Bjerrum’s crescentic scotomata may be partially or wholly relative. They generally arise from the blind spot, but may also commence in another part of the arc. They are mostly best developed at the blind spot, but may be more decidedly evident in other situations. Decompression operations may cause them to disappear entirely or partially, or become relative again. This recession is not always detected last at the blind spot.

2. Every case in which there is any suspicion of glaucoma, even those with normal acuity and full field, must be tested for Bjerrum’s and Seidel’s scotomata.

3. Glaucoma patients should be treated with miotics or sclerotomy only when they are under constant supervision, in order that action may be taken at once should alarming symptoms supervene.

4. Contraction of the fields and Bjerrum’s scotomata even to close to the fixation point are not contra-indications to Elliot’s trephining. Therefore, this operation is especially suited for such cases.

T. Harrison Butler.

VII.—NIGHT-BLINDNESS


(1) Birch-Hirschfeld has written a long and careful account of the numerous cases of night-blindness that have come under his care in the present war. He begins with a review of previous work and methods of investigation, and describes his own methods in detail. He has devised a simple form of lamp in which the test plate consists of five holes in a black card, evenly illuminated from behind, and in which the amount of light can be controlled by resistances, and also by the interposition of a photographic plate,
which shades from complete opacity at one extremity to clear glass at the other. The holes are 4 mm. in diameter, and are arranged in the form of a square with one hole in the centre. The square has a side of 3 cm. long. This arrangement is adapted for testing at 30 cm., so that the retinal image of one point is 0.2 mm. and should by accurate fixation fall on a rod-free portion of the retina, while the whole square occupies a retinal area of 15 mm.

His conclusions are as follows:

In his military cases he found that in 77.8 per cent. there was a previous history of defective night vision. In 52.1 per cent. the ophthalmoscopic picture was normal. In 10.3 per cent. there was defective pigmentation, and in 39.3 per cent. the pigmentation was excessive. The refraction was emmetropic in 34.2 per cent., low myopia in 23.9 per cent., myopia over 6D. in 19.7 per cent., hypermetropia in 12.8 per cent., and astigmatism in 9.4 per cent.

Hereditary influences were frequent (more than a third of the cases). Visual acuity was normal in 16.2 per cent., moderately reduced in 25.3 per cent., and greatly reduced in 12.8 per cent.

The majority (81.2 per cent.) had blue or green irides, only 18.8 per cent. had dark ones. As the author points out, this discrepancy may be accounted for by the greater number of light coloured irides in the army, and does not necessarily imply that such eyes are more liable to the affection.

Among the 22.2 per cent. of cases that had developed during the war, 6 per cent. were after wounds, 2.6 per cent. after bowel disease, and 2.6 per cent. after dazzling. 9.4 per cent. of these were observed for a considerable period, and of these 6 per cent. showed improvement. Amongst the remaining 86.4 per cent. which were previously affected, only 2.2 per cent. showed any appreciable improvement.

The visual field was concentrically contracted, especially in the older cases, markedly for blue and under reduced illumination.

Central vision in diminished light was greatly reduced in comparison with normal eyes. Specially noteworthy was the reduction of the blue sensation with reduced light.

In several cases the duration of after-images from dazzling was greatly lessened. A large number of the cases showed great susceptibility to bright light.

Investigation of the threshold stimulus and the dark adaptation rate gave very interesting results. Birch-Hirschfeld was able to differentiate three main types: type 1, threshold stimulus point raised, adaptation not at all or only slightly altered; type 2, threshold stimulus about normal, adaptation conspicuously altered; type 3, threshold stimulus raised and adaptation also interfered with. 23.9 per cent. were of the first type, 13.7 per cent. of the second, and
62.4 per cent. of the third. Cases with ophthalmoscopic changes and diminished central vision were mostly of the third type.

The author considers that the cause of night-blindness is to be sought in functional defect of the retinal apparatus concerned with dark adaptation which is often congenital. As predisposing or determining causes various defects of nutrition, loss of blood, fatigue, etc., as also those more direct effects on the retina produced by dazzling, certain toxic and autotoxic poisons, and the stretching of the posterior pole of the eye that takes place in high myopia. Several of these causes commonly work together.

In milder degrees of the affection (stimulus perceptibility in darkness not less than one-third normal) and in which the visual acuity is good, field service need not be forbidden. In more severe cases even satisfactory garrison duty may be impossible.

Night-blindness sufficient to exempt from service seldom comes into question and requires careful confirmation.

The prognosis as regards improvement is better in recent cases than in those of longer duration, and best in the seldom seen acute forms, especially of epidemic form, which, however, the author has found rare in his military experience.

Treatment consists in improvement of the general body condition and protection of the eyes from dazzling.

Abibliography of German literature on the subject follows the paper.

E. E. H.


(2) Since his publication on the subject in 1915 (Klin. Monatsbl. f. Augenheilk., Bd. XV, p. 474) Augstein has had 63 cases more of night-blindness which he has investigated fully. They go to confirm the views he put forward then, and to throw more light on the affection.

He classifies the cases into three groups. The first group: The whitish-grey fundus (der weissgraue Fundus), characterized by a remarkable veil-like white striping which accompanies the large vessels to a considerable extent, besides the whitish-grey colouration which stretches from the papilla towards the region of the macula.

The second group: in the periphery—deep black flecks, thick black streaks, white spots and stripes, depigmentation often in triangular form are distinctive of the fundus.

The third group: greyish-white stripes in the periphery, larger or smaller decolourised patches often surrounded by light or dark greyish-black pigment, and simple depigmentation.
NIGHT-BLINDNESS

After critical estimation of all the findings in the first group, Augstein feels certain that the whitish-grey fundus has a distinctive significance as regards night-blindness. He thinks it highly improbable that there could be a case of whitish-grey fundus with normal vision for the luminous dial (Leuchtuhr). The occurrence of ring scotomata in two cases with pronounced hereditary night-blindness; in one case congenital amblyopia in one eye; in another, extreme night-blindness, with congenital amblyopia in one eye, and associated with the whitish-grey fundus on both sides, the presence of fine pigment here and there in the form of streaks; bilateral nasal conus with anisometropia in a third; the marked diminution of vision in one case; the extraordinary pronounced hereditary night-blindness without ring scotoma in two cases. The relatively high, but yet limited power of adaptation in one instance—all these lead to the conclusion that the whitish-grey fundus concerns the most varied gradations of an anomaly of the retina that in derangement of function manifests a resemblance to retinitis pigmentosa and retinitis punctata albescens.

As regards the nature of the whitish-grey fundus, Augstein has hardly any doubt that it is due to a peculiar kind of decolourisation of the pigment epithelium. This distinctive background presents the most varied gradations between the grey striaion in the neighbourhood of the papilla and along the main vessels frequently seen in normal fundi to denote the course of the nerve fibres, and the extremely marked cases pictured in some of his figures. He has not yet concluded his investigation as to the frequency of occurrence of this fundus in the two sexes and at different ages. It appears probable to him that with the advance of age the development of pigment epithelium wanes. Those extreme cases which, owing to hereditary night-blindness and ring scotoma, present a pre-stadium (Vorstufe) to retinitis pigmentosa sine pigmento, require histological examination (to establish their relationship to the latter).

As regards the second group, he thinks that the fundus appearances have nothing to do with inflammatory diseases, and that one has to assume an emigration of pigment, due to repeated strong illumination of the eye, to explain the pigment collection in spots and streaks. As an exception, ring scotoma can occur in extreme cases of this group.

There is no new finding concerning the third group.

The account he gives of an epidemic of acute night-blindness due to exposure of the eye to intense light (Blendungshemeralopie) is very interesting. Of 100 Russian Mahomedan prisoners of war working on the estate “Pawlowken,” 31 became affected with night-blindness. Of these cases, 22 had the whitish-grey fundus, 7 showed depigmentation in the periphery, and in 2 cases there
was no change discoverable in the background. They were all extremely well nourished. The improvement after 72 hours’ confinement in utter darkness was prompt in every case, so that the patient could get about unaided in the dark, although normal adaptation had not been recovered by any of them. They were all given dark-grey protecting glasses to wear, and further improvement set in by degrees. Of the 69 unaffected Mahomedans who worked and lived under the same conditions as the 31 affected, 59 were available for examination, with the remarkable result that in 40 of them the “fundus hemeralopicus” was altogether out of the question; in 11 the hemeralopic fundus was present: eight times the whitish-grey fundus and thrice the fundus of the third group. Of these 11 cases, 9 became hemeralopic later and 2 remained unaffected during the period of observation. The fundus of the second group was never met with in any of these patients. The study of this epidemic forms a valuable support, according to the author, to the correctness of his view of night-blindness. In none of the cases was any considerable error of refraction evident, although, owing to the language difficulty, it was not practicable to take the exact vision, and charting the vision was out of the question altogether.

The following are the conclusions he arrives at: “If out of 173 cases, in only 3 cases no fundus change was discoverable, it is presumable that it is a rare occurrence, to a certain extent an exception. Further, in night-blindness there are changes in the pigment epithelium in typical form constituting the “fundus hemeralopicus.” External injurious influences of the most varied kind could cause a deficient regeneration of the visual purple to make itself manifest eventually as night-blindness, while there was already present for a long time, if not always, deficient power of adaptation.”

The question of therapy comes in only in the case of night-blindness due to undue exposure of the eyes to strong light (Blendungs-hemeralopie); here a three days’ confinement to the dark (Dunkelkur) appears to have good effect; protecting glasses are also useful later. The luminous dial (Leuchttuhr) gives results which, although not of any scientific value, are certainly of practical utility, and could even take the front rank in practical examination. In the future its results must be compared with those of apparatuses for examining adaptation, as were described by Wessely and Crzellitzer in the Budapest War Sitting; in particular, Crzellitzer’s apparatus appears suited to estimate very exactly the degree of the power of adaptation (in “Mikrolux”).

There are five figures: four in colour in plates III. and IV. and one in black and white in the text, illustrative of the “fundus hemeralopicus.”

D. V. GIRI.
NIGHT-BLINDNESS

(3) Dehogues (Habana). — True night-blindness in Cuba, especially in the charcoal burners. (La hemeralopía esencial en Cuba, especialmente en los fabricantes de carbon.) *Archivos de Oftalmología Hispano-Americanos*, August, 1917.

(3) The author finds that true night-blindness is rare in Cuba, notwithstanding what might be expected to the contrary from its geographical position in the torrid zone, where the glare is intense. He has only met with records of 60 cases in more than 20,000 patients.

He draws attention to the night-blindness met with in charcoal burners, and has been allowed to give a short description of how this industry is worked in Cuba. His description is as follows: “In the neighbourhood of a forest where the green guava and other timber is abundant, the firewood cutting (corte de leña) is established; the fragments of the trees are grouped in the form of a cone, and completely encompassed with earth, leaving the summit of the cone of wood and earth free. The wood is fired and combustion is effected slowly. The smoke escapes through the summit of the cone and is circulated by the breeze into the surrounding atmosphere. The charcoal burners build their huts in close proximity to these kilns, and pass all their time in the neighbourhood. Should the atmosphere be calm and the breezes fail, the smoke instead of circulating falls to the level of their huts, and the charcoal burners are constantly breathing it. It is estimated that the composition of the smoke is almost completely pure carbon dioxide.

Charcoal burners are especially liable to night-blindness during the months of August to November. Examination of the blood in cases affected with this condition, proves a marked diminution in the haemoglobin. Patients were treated with tonics and kept in a subdued light. The blood, examined at the end of five days, was found to be normal as to the haemoglobin, and the night-blindness disappeared.

Ophthalmoscopic examination was always made with scrupulous care, and the fundus in every case was found to be healthy. The fields showed no contraction. The night-blindness varied in amount in different cases, some were incapacitated completely by it. Relapses were by no means infrequent on returning to work.

A series of ten cases of night-blindness in charcoal burners is appended.

R. R. James.

(4) Landolt, Marc.—Defective nocturnal vision among soldiers. (Les troubles de la vision nocturne chez les soldats.) *Arch. d'Ophtal.*, July-August, 1917.

(4) This is a painstaking report, extending to no less than 26 pages,
of an investigation of night-blindness among men of the French Army.

The author begins by distinguishing three degrees of darkness: (1) dusk, (2) black night, an exaggeration of dusk, (3) clear night, with sufficient luminosity for the normal eye to have very good visual acuity. He groups his cases thus:

I. Men whose diurnal visual acuity is below normal, including (a) men with fundus lesions, (b) men with corneal lesions, (c) ametropes, uncorrected or badly corrected.

II. Men possessing normal diurnal visual acuity, including (a) corrected ametropes, (b) men in whom night-blindness is associated with dyscrasia of sorts, e.g., that resulting from insufficient food, (c) cases of night-blindness of nervous origin, (d) men with congenital night-blindness.

After a section concerning methods for the examination and diagnosis of night blindness, Landolt sums up his observations thus:

"Soldiers complaining of defective night vision may be divided into two main groups: those who before the war had deficient nocturnal vision, known or unknown, and those who have become night-blind during the war. The cases of night-blindness revealed by the war include, first, a group designated as nocturnal amblyopes (false night-blindness) composed for the greater part of ametropes without correction or with faulty correction, and men with corneal lesions. A second group, the genuine night-blind, consists of men with choroido-retinal disease, pigmentary retinitis, choroiditis, congenital defects of the neuro-retinal system, but possessing a diurnal visual acuity and field sufficient for military requirements, and, lastly, congenital night-blindness of low degree.

"Both groups become cognizant of their defect because they are for the first time compelled to live a nocturnal life amid unfamiliar surroundings and find themselves, perhaps for the first time, in comparison with a large number of normal sighted individuals.

"The second category, that of night-blindness caused by the war, is, in our experience, very limited; we have not seen any well-marked cases associated with an enfeebled state of health, but have met with a few young weakly individuals, with normal vision, who complain of night-blindness. Such cases are to be considered as sick men, and are usually easily and rapidly cured by appropriate treatment. The four or five cases under our observation had completely recovered in three to four weeks, under treatment by extra diet, cod liver oil, etc.

"All my confrères are agreed that with the exception of cases of retinal disease with considerable contraction of the field of vision, the symptom of night-blindness alone does not justify the removal of the man from active service in the field."

J. B. Lawford.
Frenkel, H.—Night blindness among the mobilised auxiliary forces. (L'hémeralopie chez les mobilisés de l'intérieur.) Arch. d'Ophtal., July-August, 1917.

Frenkel, in examining the workers in the powder factory at Toulouse, found an unusual proportion complaining of varying degrees of night-blindness. Although in a number of cases simulation of this defect from a desire to escape night work was apparent, the percentage of cases of real defect of night vision was abnormal. Frenkel thinks that this is partly explained by the fact that a very large proportion of the hands employed in the National Powder Factory are men mobilized for auxiliary service, and of such workers a large percentage are myopes.

He examined, by means of Foerster's photometer, 48 individuals complaining of defective sight at night; all these proved to be night-blind. Of the total number, 30 were myopes, 2 were hypermetropes, 7 had ocular disease, the nature of which is not stated, 8 were examples of congenital night-blindness, 1 was a case of hemianopia of cortical origin.

Frenkel has found Foerster's photometer of considerable service in the detection of simulated night-blindness.


Jess's observations on the intimate connection between heme-ralopia and defective colour vision, in the sense of an acquired relative blue yellow blindness, is not only of use as a diagnostic method, but also throws some light on the as yet unexplained pathology of the affection. This characteristic colour vision defect, which may go on to absolute yellow blue blindness, is a symptom of retinal oedema. In this connection recent observations during the war on so-called hunger oedema are of interest. In addition to the oedema which we know in connection with kidney disease, such processes may affect the lids to such an extent as to render it almost impossible to open them. As we recognize the occurrence of oedema in different external and internal organs as a result of toxic influence on nutrition, so also may we assume that toxic disturbance of the retinal nutrition causing oedema may lead to hemeralopia. Jess has been able to note a characteristic peripapillary oedema of the retina in several cases.

E. E. H.