

refraction, occlusion of one eye and attention to physical health without orthoptic exercises.

A discussion on "Miners' nystagmus" was opened by Mr. T. Harrison Butler. Postural, lighting, toxic, psychasthenic and other associated factors in this disorder were reviewed.

The following is a list of other scientific papers read and discussed before the Congress:— "Ocular filariasis, with a report of a case in which microfilaria Bancrofti was seen in the anterior chamber," Mr. W. H. McMullen. "The ophthalmic surgeon, a functional operative paresis," Mr. Basil Graves. "Number forms," Mr. P. G. Doyne. "The aqueous, a secretion," Dr. J. Douglas Robertson. "How is a hyphaema or a hypopyon absorbed?" Mr. Thomson Henderson. "The latest principles for applying tinted glass to industrial and other purposes," Sir Arnold Lawson. "Drusen of the retina: a clinical and pathological study," Dr. Bernard Samuels. "The clinical application of vital staining in fundus lesions," Mr. Arnold Sorsby. "Some successful corneal grafts," Mr. Tudor Thomas. "A new unobtrusive occluder," Mr. F. E. Preston. "Eye injuries—workmen's compensation and disabilities schedules," Sir Arnold Wilson.

Abstracts of some of these papers will be published in this section of the Journal later.

Cinematograph films were shown by Mr. R. Weedon Butler on Lexer's operation, Miss Margaret Dobson on orthoptic training in cases of convergent concomitant strabismus and Dr. La Rocca (New York) on a new method of stitching for corneal grafts.

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## ABSTRACTS

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### I.—GLAUCOMA

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(1) **Schmelzer Hans (Erlangen).** Research on general causes of glaucoma. (*Untersuchungen ueber allgemeine Glaukomursachen*). *Arch. f. Ophthal.*, Vol. CXXXIX, p. 465.

(1) **Schmelzer** examined the blood serum of a large number of glaucoma patients and normal control persons for uric acid, blood sugar, bilirubin, indican, cholesterin and the xanthoprotein reaction, and the urine for albumin, sugar and, in a few cases, urobilinogen.

The results showed that there was never any change in the indican and seldom in the blood sugar or uric acid; on the other hand in almost every case of glaucoma a marked increase of the cholesterin content and a positive xanthoprotein reaction as compared with that in the normal patients, and in 20 per cent. of the

former a rise in the bilirubin in the serum. The different types of primary glaucoma showed no appreciable difference in the various tests. The examination of the urine gave negative results.

These increases very probably indicate a certain disturbance of function in the liver as well as slight renal deficiency. It is uncertain whether these general disturbances of metabolism really constitute the ultimate causes, or only play a co-ordinated rôle in the pathogenesis, of primary glaucoma.

As regards treatment the writer suggests, in conjunction with the usual local therapy, the adoption of general measures, such as the avoidance of alcohol and nicotine and in particular food rich in protein and fat. The injection of insulin in special cases—5 to 10 units daily—in order to reduce cholesterin content is also mentioned.

THOS. SNOWBALL.

- (2) **Rubino (Padua).**—The condition of the cerebro-spinal fluid in glaucoma. (*Ricerche sulla pressione e composizione del liquidocefalo-rachidiano dei glaucomatosi, etc.*). *Rass. Ital. d'Ottal.*, November-December, 1938.

(2) **Rubino** recently published some research on the condition of the cerebro-spinal fluid in cataractous patients; now he extends these researches to the glaucomatous and pays special attention to the behaviour of the filtering membrane (*barriera emato-liquoriale*) between the blood vessels and the cerebro-spinal fluid. This barrier is represented by the choroidal plexuses and the capillaries of the meninges. In this examination, the fluid was extracted from the fasting patient in the morning, and blood taken from a vein at the elbow at the same time. To test the "barrier" he used Walter's "quotient of bromine" which involves the estimation of bromine in the C.S.F. and the blood; in the latter the concentration is three times as great as in the former.

As a result of the comparison of normal and glaucomatous people, the author finds the calcium in the blood and C.S.F. slightly less in the glaucomatous, but the difference is so little that he considers it negligible. He finds "Walter's quotient" reduced in glaucoma, which shows an increase of permeability of the haemato-liquorial barrier. This fits in with modern theories of glaucoma.

HAROLD GRIMSDALE.

- (3) **Casini (Pisa).**—A case of chronic glaucoma with delayed hypertension. (*Considerazioni e ricerche in un caso di glaucoma cronico semplice a ipertensione tardiva*). *Arch. di Ottal.*, January, 1939.

(3) **Casini's** case was that of a woman, aged 66 years, who had noted slight visual failure for a year without pain until ten days

before her visit, when for the first time she had violent pain about the left eye. The vision of the right eye was 4/10; there was slight cupping of the disc; the left eye had a turbid vitreous and the fundus could not be seen. The visual fields were concentrically contracted to 15°. Various tests were made.

Increase of fluids in the diet was followed by marked diuresis. Injection of histamine was followed by a great increase of the intra-ocular pressure of the right eye, and a less rise in the left. The action of histamine is a dilatation of the capillaries, together with a vaso-constriction of the arteries. The rise in glaucoma seems to depend on the increased permeability of the capillary system. It is probable that in the case under examination there was a sudden rise in pressure in the left eye, giving rise to the pain of which the patient complained; afterwards this pressure passed off, leaving the tension lower than normal.

HAROLD GRIMSDALE.

- (4) **Nicolato (Pavia).**—The aetiology of glaucoma following division of after-cataract. (Note sull'etiologia e la patologia del glaucoma conseguente a discissione di pseudo-cataratta). *Arch. di Ottal.*, January, 1939.

(4) A patient who had undergone cataract extraction without any complication, after division of the subsequent after-cataract, developed acute glaucoma which eventually yielded to iridectomy. A few days later the patient died from cerebral haemorrhage. **Nicolato** discusses the cause of the glaucoma. He comes to the conclusion that the increase of tension must have been due to oedema of the vitreous. Examination of the eye showed no adhesion of the iris or capsule to the wound, nor any swollen lens débris in the vitreous. When the vitreous is markedly degenerate, the eventual result is usually good. The final cause is probably to be sought in a variation of the state of the vessels of the uvea and retina.

HAROLD GRIMSDALE.

- (5) **Friedenwald, J. S. and Stiehler, R. D. (Baltimore).**—Circulation of the aqueous. A mechanism of secretion of the intraocular fluid. *Arch. of Ophthal.*, November, 1938.

(5) **Friedenwald and Stiehler's** work was undertaken with the aim of discovering the character and mechanism of the irreciprocal permeability of the ciliary body, which allows fluid to pass with ease from its capillaries to the posterior chamber but obstructs the passage of fluid in the reverse direction. The experiments were carried out with acid and with basic dyes and the following conclusions were reached:

1. Under normal respiratory conditions, acid dyes are transferred from the epithelium to the stroma and basic dyes from the stroma to the epithelium. The phenomena disappear under asphyxia and can be accounted for by an ionic current carrying anions from the epithelium to the stroma and cations from the stroma to the epithelium.

2. By study through indicators of the oxidation and reduction processes in the ciliary tissues it was shown that the potential of the epithelium in air was 0·100 volt, while that of the stroma in air is -0·130 volt. Under nitrogen (acid p.H.) or in the presence of cyanide this difference of potential was abolished.

3. It could be accounted for, at any rate in part, by the presence in the epithelium of indophenol-oxidase and the absence of this enzyme in the stroma. Hence the abolition of the potential difference by asphyxia.

4. When this potential difference is abolished, the stroma-epithelial barrier shows a selective permeability in favour of acid and neutral dyes and a relative impermeability to basic dyes. If the acidity is raised still higher, the selective permeability is reversed and this point is known as the iso-electric point. From data such as the width of the iso-electric zone the potential generated by the oxidation-reduction system is calculated with certain assumptions to be 0·140 volt at p.H. 6·6. Consequently, electrons can be received by the barrier from the stroma and transferred to the epithelium.

5. Experimental perfusion of rabbit's eyes with electrically charged solutions shows that the difference of electrical mechanism responsible for the transfer of dyes in the ciliary body is adequate to explain also the transfer of water in this tissue.

6. The ciliary capillaries are much more permeable than either the capillaries of the iris or the stroma-epithelial barrier, the latter being the least permeable of the three anatomical barriers between the blood and the aqueous. This mechanism must not be thought of as solely responsible for the formation of the intra-ocular fluids.

F. A. W-N.

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## II.—TRACHOMA

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(1) **Foley and Parrot (Algiers).**—*Sur les formes d'évolution de Rickettsia trachomatis.* *Archiv. de l'Institut Pasteur d'Algérie*, Tome XVI, No. 3, 1938.

(1) **Foley and Parrot** have previously reported on the Halberstaedter-Prowaczek Körperchen, the infecting agent of trachoma, which appears as elementary bodies which have their life-history in

the epithelial cells of the conjunctiva. They call them *Rickettsia trachomatis*. (*Arch. Instit. Pasteur d'Algerie*, t. XV, No. 3, 1937, pp. 339-349.) They recognized Lindner's initial bodies, whence are derived the elementary bodies.

The method adopted for obtaining microscopical preparations was as follows:—A fragment of conjunctiva is removed from the everted upper lid near the outer angle; this is spread on a glass slide and fixed in iodized alcohol for four or five minutes, and then stained with a mixture of one drop of May-Grunwald, one drop of Giemsa and 10 drops of neutralized water. Differentiation is carried out with 95 per cent. alcohol.

The *initial body* stains a deep violet-blue and is 1 or  $2\mu$  in diameter; it may occupy any position in the cytoplasm; often two bodies are in close proximity. It increases in size, becoming mulberry-shaped, and divisions becoming apparent; soon it is seen in close proximity to the nucleus of its epithelial cell host.

The *elementary bodies* are formed after the disintegration of the initial bodies, and appear as dark bluish-violet dots which increase in size to  $0.2\mu$ , and become purple in colour. There is a multitude of these tiny bodies which are contained in a fine membranous envelope. This sac may displace the cell nucleus to some extent. It then bursts and the elementary bodies become scattered throughout the epithelial cell, and finally destroy it. At the same time their colour changes, and they become a greenish-blue.

It is to be supposed that the elementary body penetrates into another epithelial cell, and gives rise to a new initial body, and then the cycle recommences.

A. F. MACCALLAN.

- (2) **Cuénod and Nataf (Tunis).—Nouvelles recherches sur le virus trachomatoux.** *Archiv. de l'Institut Pasteur de Tunis*, Tome XXVII, No. 3, September, 1938.

(2) The discovery of Rickettsia-like bodies in trachoma was reported by Busacca in the first instance and independently by **Cuénod** and **Nataf** about the same time. The importance of the louse either as a reservoir or as a vector of the trachoma virus has been claimed by the two last-named workers. Poleff has published results of researches on the culture *in vitro* of these Rickettsia-like bodies.

The identity of the Rickettsia-like bodies with the Halberstaedter-Prowaczek Körperchen has been asserted by Thygeson, by Cuénod and Nataf, and by Foley and Parrot. The authors have produced trachoma in man by inoculation with material from lice infected with trachomatous material.

Now the authors state that by inoculating the chorio-allantoic

membrane of eggs with trachoma virus containing the Rickettsia-like bodies they have been able to transmit these bodies from egg to egg during several passages. They also suggest certain histopathological analogies between trachoma and typhus fever.

According to experiment 305 a fragment of trachomatous conjunctiva was received in Paris two days after it had been removed from a patient in Tunis. No growth was obtained on eggs but inoculation of the testicle of a guinea-pig resulted in the development of Rickettsia-like bodies. Another guinea-pig similarly inoculated gave a similar result; with material containing the Rickettsia-like bodies the testicles of rats were inoculated; from these rats the conjunctiva of a *Macacus rhesus* was inoculated, which resulted in a temporary follicular conjunctivitis of one eye, which the authors consider to have been an attenuated form of trachoma. Therefore the trachomatous virus was conserved in passage through both guinea-pig and rat.

It is known that when the tunica vaginalis of guinea-pigs is inoculated with typhus material epithelial inclusions of elementary bodies (Halberstaedter-Prowaczek Körperchen) are found just before Rickettsiae appear, but are no longer found when the Rickettsiae are at their maximum of development. The authors suggest that these are different stages in the development of the same micro-organism. Analogous observations have been made in trachoma; further research on these lines is proposed.

A. F. MACCALLAN.

- (3) **Poleff, L. (Institut d'Hygiene du Maroc).—Passage des Corpuscles Rickettsoides du trachome sur le tissu de l'oeil humain hors de l'organisme et quelques observations generales sur la culture des dites formations in vitro.** *Rev. Internat. du. Trach.*, p. 79, April, 1939.

(3) At the present time it appears to be certain that in trachoma certain very minute bodies are present which have been called "Rickettsia-like," and are generally considered to be the aetiological factor of the disease.

**Poleff** was the first to have success in the tissue-culture of these Rickettsia-like bodies (*Arch. of Ophthalm.*, p. 882, 1936). Here he describes his latest methods in order that the details of his research may be repeated by others.

Outside the organism a growth of the Rickettsia-like bodies is manifested at first only in cellular cultures of conjunctival or corneal trachoma tissue, which has never been treated. This tissue must be obtained by excision and not by scraping, and sown in Carrel's flasks by the authentic methods.

Differentiation of virus particles from the detritus requires

experience but is quite possible; and their microscopy may require enormous patience.

Smear preparations should be made as thin as possible avoiding all unnecessary damage to the cells. "Impression" preparations are advised. Staining should be carried out with weak Giemsa for 24 hours with differentiation by alcohol and xylol. Castaneda-Lepine and Victoria-blue stains are also useful.

In order to effect "passages" on fresh tissue, which is uncertain except with human material, direct and prolonged contact is required. This can be effected by placing the minute fragments of tissue containing the virus on the surface of the new fragments destined for the passage, or by plunging such fragments for half-an-hour in a virulent emulsion before passing to the new culture medium. The best culture medium has been found to be the human placenta.

However, the infection of man from a tissue culture of trachoma has not yet been effected.

The following experiment is described:—A young Moroccan, who was shown by slit-lamp examination to be entirely free from trachoma, required operation for a staphyloma of the cornea. A part of the cornea which was fairly transparent was used for cultures *in vitro*. At the same time tissue was removed from the conjunctiva of another young man with untreated trachoma in the stage II $\alpha$ . Tiny fragments of the staphylomatous cornea were placed in contact with pounded up trachomatous material in Tyrode's solution. Five of these fragments were explanted in a hanging drop in a mixture of fowl plasma, human blood-serum and fowl embryonic extract; five in concave slides with human serum (two parts) and Tyrode's solution three parts. Half the cultures were placed in an incubator at 37 degrees, and the rest in an incubator at 32 degrees. As controls cultures of uncontaminated cornea, and cultures of trachomatous cornea were employed.

The result of the experiment was as follows:—After incubation for five days there was an insignificant growth in the plasma cultures, and no change in the liquid medium. By smears no Rickettsia-like bodies were found; by culture on ordinary media no bacteria were found.

After 10 days a distinct increase of Rickettsia-like bodies was found in the infected corneal cultures, and in the trachomatous tissue; there was none in the non-infected corneal culture. Passage on a placenta medium of the Rickettsia-like bodies obtained from the corneal culture was positive.

It therefore seems to the author that corneal tissue, especially if obtained from human embryos, or from corpses immediately after death, forms the best culture medium in experimentation of this nature.

A. F. MACCALLAN.

- (4) **Taborisky, J. (Palestine).**—*Sur les problemes du trachome et les methodes de leur solution.* *Rev. Internat. du Trach.*, April, p. 65, 1939.

(4) It is **Taborisky's** experience that trachoma begins acutely in persons who have never been in contact with any source of contagion up to the time when such contact occurs and when they succumb. When, however, the disease begins insidiously it will be found that the patient has been in continual association with trachomatous persons, a reiterated minimal infection having produced a relative immunity.

It has been asserted by Morax, MacCallan, Wilson and others that it is impossible to differentiate microscopically between trachoma and a follicular conjunctivitis, however, the author is not of this opinion.

A. F. MACCALLAN.

- (5) **Cavallacci (Pisa).**—*The treatment of trachoma by salts of gold. (L'auroterapia nel tracoma).* *Arch. di Ottal.*, December, 1938.

(5) Gold salts were first used in the treatment of tuberculous disease of the eye; after the first expectation (that in gold a specific for tubercle had been found) was disappointed, the salts were used to improve the general defensive power of the organism. **Cavallacci** has found no mention of use in trachoma and has thought it interesting to test it. He used an oily solution of solganol B at first in strength of 2 per cent., and later in 20 per cent.; one series of experiments by instillation into the conjunctival sac; a second series was treated by intramuscular injection of the solution.

The results of the first series were negative; no improvement followed in any case. The second series showed that alone, the drug was not capable of effecting a cure, but when combined with the usual local treatment the disease was more rapidly relieved. The intramuscular injections are well borne.

HAROLD GRIMSDALE.

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## CORRESPONDENCE

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### CILIA IN VITREOUS AS A RESULT OF PENETRATING WOUND OF THE EYE

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*To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.*

DEAR SIRS,—On Wednesday, April 12, a small boy, aged eight years, was struck on the right eye by a pellet from a shot gun.