
Knapp in this paper, gives an account of the aetiology and treatment of keratoconus. He describes the cause of keratoconus as an aberration in development due to some failure in the normal toughening process which takes place in the tissues. The corneal tissue becomes stretched and the intra-ocular pressure may be normal or even sub-normal. The condition first attracts attention in adolescence. Some of the affected patients are poorly nourished anaemic females who show signs of hypothyroidism. Associated physical signs may be dry skin, increased sweating, fragile nails, loss of hair, hypertrichosis, lymphocytosis 40-58 per cent., increased coagulability of the blood, and a low basal metabolic rate.

Török and Redway have described decalcification in the cranial bones of three female patients suffering from keratoconus. von Hippel and Schnaudigel consider that the thymus plays a part in the aetiology of this disease, and Stähli attributes familial and hereditary factors to it. Jaensch suggests that there is a hereditary predisposition comparable to that of myopia.

Knapp describes six patients in whom there was mild anaemia, thyroid deficiency, and low blood pressure. The blood chemistry, radiographs, and calcium figures revealed no abnormality. The basal metabolic rate was low in two patients only.

He discusses the relative value of treatment by contact glass, trephine, and electro-cautery. In performing cauterization atropine and cocaine are instilled into the affected eye, the apex of the cone is carefully localized with a Placido's disc, and the cautery applied to the cornea to make an interrupted Maltese cross pattern, *e.g.*, the cauterization stops short of the apex at the centre and the canal of Schlemm at the periphery.

Atropine ointment and a binocular bandage are used for 8-14 days, and a firm monocular bandage is applied for 5-6 weeks. After this the eye is bandaged for a further six weeks during sleep only.

The complications that may arise are herpes of the cornea, superficial punctate keratitis, hemicrania, corneal fistula, panophthalmitis, secondary glaucoma, and slow restoration of the anterior chamber.

H. B. Stallard.

Berg recalls that the cornea is more spherical centrally than peripherally, the peripheral flattening taking place more abruptly above than below, and more on the nasal side than on the temporal. He points out that the curve of the horizontal meridian is more regular than that of the vertical. In fact the vertical meridian has an area of increased refraction at about 15° from the centre: it is beyond this band that the peripheral flattening sets in. This area of increased refraction corresponds to the upper lid marginal line described by Hardmann, a line that can occasionally be seen to run across the upper part of the pupillary area, especially noticeable when the eye is made to look downwards. It is most frequently seen in the young and middle-aged, and more marked in cases of chronic conjunctivitis and blepharitis. The majority of observers are against regarding it as mechanically produced by pressure from the lid, believing that it is probably due to some physical or optical changes produced by imbibition or some similar cause.

The author gives curves of horizontal and vertical meridians plotted out by measurement with a modified Javal-Schiötz ophthalmometer, and these clearly bring out his contentions. He agrees with Gullstrand in regarding the peripheral flattening of the cornea as due to pressure of the lid, the flattening itself producing compensatory changes in corneal curvature, either in greater central curvature (producing regular astigmatism) or in greater curvature in the area adjacent to the flattened part (producing Hardmann's line.) He gives the horizontal curve of a case in which a chalazion centrally situated in the upper lid produced not only a central depression, but also a peripheral elevation. A week after operation the curve had assumed a much smoother course.

ARNOLD SORSBY.


There are three ways, says Nicolato, in which conical cornea may be favourably affected; by reducing permanently the intra-ocular pressure; by increasing the resistance of the cornea; and by altering its curvature. He has not had any considerable success by any of the usual methods, but has been encouraged by
the results which he has obtained after removing the lens. He thinks that the bad results of this operation in high myopia, are due to the pathological changes which high myopia brings about in the several deeper structures of the globe. When the eye as a whole is healthy as is the case in conical cornea, the operation has no special risks; it acts favourably both by reducing the intraocular pressure and by lessening the acquired myopia.

Harold Grimsdale.


"While the use of contact glasses and their possibilities cannot yet be said to have been fully explored, my brief experience has already convinced me that they have come to stay, and that in the future they will be found to constitute a very important addition to the methods now available for conserving and treating defects of vision."

So runs the concluding sentence of Rugg-Gunn's article. The slight ambiguity of the last clause is apparently due to wrong punctuation. The difficulties and disadvantages of the use of these glasses, as well as their undoubted possibilities in certain cases can readily be appreciated on perusal of this somewhat optimistic article, which does not lend itself to useful condensation.

Ernest Thomson.

(5) Heine, Leopold (Kiel).—The use of contact glasses. Lancet, March 21, 1931.


(5) That contact glasses may be of service in certain cases seems to be admitted. That their application by the surgeon and afterwards by the patient is equally troublesome—the French word fâcheux and the Scots allied word fashious best express the meaning—is certain. In the Lancet for November 15, 1930, Rugg-Gunn described the glasses, their peculiarities of shape and the difficulties in connection with their application. He also stated that the majority of patients acquired tolerance surprisingly soon.

Heine, who has already published work on the subject, refers to Rugg-Gunn's article in the Lancet and seems rather to amplify the difficulty of the task of ascertaining the correct curvature, the scleral radius (the radius of the contact ring) and the actual application of the glass to the patient's eyeball. He points out that the surgeon should have a set of glasses of more ample range
than that mentioned by Gunn. He also says that "It is of considerable value for the patients to be given, immediately after the examination, the identical glass which they selected; this has psychological value, as patients are often unable to get the glass in and out when it comes to them from the makers after a few days, even though it is, in fact, a perfect fit." The details of the application and removal of these glasses must be sought in the various original articles, but it may be said that the principle is not unlike that of the familiar "sucker," except that in the case of the contact glass the fixed element is the glass and the elastic element is the eyeball, so, at least it appears to the reviewer. Two more short quotations from Heine's article may be given: "If all these points (i.e., about the proper selection and fitting of the glass) are remembered, failures are very rare. There will always be some people whose eyes are so shaped that a spherical glass cannot adhere to them, and there will always be sensitive patients who cannot get accustomed to wearing this uncomfortable fitting on the most delicate surface in the body." Again, "All the writers on contact glasses in the past have used a fixed scleral radius of 12 mm. and that is the reason why experiments on this form of correction—which have been made for the last 100 years—have hitherto all failed. It is not the optics of the method that constitute the difficulty, but the application of the glass to the cornea, which demands not only correct scleral radius but also a good relation to the optical dimensions." The list of ocular conditions in which contact glasses are of service is quite long, so long, in fact, that one cannot help feeling that the author has overstepped the line which separates the practical from the ideal. Reports of ten cases are added at the end of the article. These are described as "illustrative" and one is led to assume that Heine must have very considerable experience in the use of contact glasses.

Affleck Greeves refers to the articles by Rugg-Gunn and Heine. He deals with only one case and especially with the method of insertion. The reviewer has refrained from the attempt to epitomize methods of application, while full transcription would occupy too much space. Therefore, readers must go to the originals for this. It may be said that the principal difficulty encountered by Greeves was the avoidance of the air bubble between the glass and the cornea, the same air bubble in fact which would vitiate the efficiency of the schoolboy's sucker if he did not step solidly on his apparatus. Here, in the case of the oculist, it is a case of *suaviter in modo* and not *fortiter in re*. Greeves's method avoids the air bubble but at the expense—in both senses of the word—of an assistant.

Ernest Thomson.

Mamoli reminds us that contact lenses are no new thing. Fick, in 1888, to do away with the difficulties of correcting gross errors of refraction such as occur in conical cornea, suggested the use of a thin shell of glass with parallel spherical surfaces, applied to the cornea; the space between the shell and the eye was to be filled with some bland solution.

These shells were made by blowing, and therefore it was difficult to ensure that the optical effect obtained was that required since the curvature was less easily controlled than by grinding; but, on the other hand, Mamoli states that they were worn with less inconvenience; presumably because the surface of a blown sphere is smoother, and less irritating than a ground surface. In any case their employment is of limited scope.

Harold Grimsdale.

Pischel, Dohrmann K. (San Francisco).—Tattooing the cornea with gold and platinum chloride. Arch. of Ophthal., February, 1930.

Pischel's technique for tattooing with gold chloride is as follows. The cornea is anaesthetized with cocaine but no adrenalin is used, as it is a reducing agent. The area to be stained is outlined carefully with a knife or large trephine and the epithelium thoroughly and evenly scraped off. The solution of gold chloride should be of 2 per cent. strength with sufficient bicarbonate solution added to render it just faintly acid to litmus paper. It is applied on a piece of cotton wool large enough to cover the required area, the wool being pressed out so as not to be dripping wet. A fresh applicator is used every minute, three minutes' treatment produces a brown, and five minutes an almost black stain. Very dense scars may need a 3 per cent. or possibly a 5 per cent. solution. Any variety of scar may be treated, even thin staphylomatous ones with iris inclusion. The results are fairly gratifying though in the course of 6-8 months, the stain may fade a little, this fading being more marked if the leucoma be a vascular one. Platinum chloride would seem to give a dense and more permanent blot. The technique is to scrape the epithelium as for gold chloride and then stain the area with fluorescein after which it is washed with sterile distilled water. Two per cent. platinum chloride is then applied in the same way as the gold chloride for two minutes, when it is reduced by hydrazine hydrate instilled by a dropper. The latter is washed out with distilled water after 25 seconds, two minutes later the eye is irrigated with normal saline.

F. A. W-N.
Friedman, They with argyrosis cornea. The pigmentation, the development of the weakest lens, appearing as a yellowish reflex from the anterior capsule and

(8) Shoji, Y. (Fukuoka, Japan).—A pigmented network of the posterior surface of the cornea. (Sur un réseau pigmenté à la face postérieure de la cornée). Arch. d'Ophtal., March, 1930.

(8) The condition here recorded appears to be quite unusual; indeed Shoji in a comprehensive search has failed to find records of any similar case. The coloured illustrations of the pigmented area, seen with an ordinary loupe and with the corneal microscope, give a much better idea of the condition than can be conveyed by a written description.

The patient, aged 64 years, had undergone operation for cataract in both eyes, eight years previously, and came under observation for failing sight due to secondary cataract. The changes on the cornea were present in the left eye only. The pigmented network occupied a circular area of 3 mm., in the centre of the cornea, and had a brown colour similar to that of the iris. Seen with the slit-lamp the filaments appeared as brilliant golden threads on the black back-ground of the anterior chamber. There were no points of adhesion between the pigmented patch and the iris or the opaque capsule. On the back of the cornea there were also some brown pigmented dots, placed around and 1 mm. from the edge of the circular patch. Attached to the anterior surface of the iris near the pupillary margin were some small brown fibrils, the distal ends of which were free in the anterior chamber. All these changes are well shown in the coloured plate.

The author discusses very fully the possible origins and mode of development of this pigmented network: he concludes that it is the result of an anomaly in the early stage of the development of the eyeball. A comprehensive list of references is appended.

J. B. Lawford.

(9) Friedman, Benjamin (New York) and Roth, Andras (Budapest).—Argyrosis corneae. Amer. Jl. of Ophthal., December, 1930.

(9) Friedman and Roth examined the corneae of 12 patients with argyrosis due to prolonged treatment for trachoma with silver salts. They found corneal involvement in 10 of these cases. It took the form of a pigmented ring the densest portion of which was towards the limbus. The colour variation from the strongest to the weakest cases was from golden brown, through yellow-green to ultramarine. The pigment was found to lie between Descemet's membrane and the endothelium, and the more pronounced the pigmentation, the further it came forwards into the substance of the cornea. There was also in some cases, an argyrosis of the lens, appearing as a yellowish reflex from the anterior capsule and
as a diffuse yellowish colouring of the posterior capsule and the adjacent cortex. The silver is probably precipitated as a mucoid and possibly also as albuminate, carbonate and chloride. The deposition of particles near the endothelium is explained by the latter having some vital quality which partly prevents the passage of solutions of heavy metals. There is thus a higher concentration of the solute near the endothelium with consequent precipitation. The same is also probably true of the lens and the reasoning applies to other metals such as copper. Since Vogt in 1929 extracted large amounts of copper and silver from spleen, liver, and kidney of a patient with hepato-lenticular disease a similar explanation has been advanced for the formation of the Kayser-Fleischer ring.

F. A. W-N.


(10) Marinosci has measured the sensitiveness of the cornea in different areas and in different conditions of health. As a means of measurement, he made use of hairs of different thickness and assumes that the stimulus given by the hair is more or less proportional to its thickness; the hairs had thicknesses from 25μ to 500μ. The thinnest hair gave no sensation to normal corneas and he has chosen the hair of 50μ as the base of measurement.

In normal people the periphery of the cornea is somewhat less sensitive than the central area, and this difference is specially marked in those who have arcus senilis. He found in epileptics almost constantly, a great difference between the two eyes; one eye being normally sensitive to a hair of 50μ and the other needing a hair of 170μ to provoke sensation.

Generally, when the cornea was inflamed and infiltrated, the sensitiveness was reduced but in cases of abrasion, where the nerves were exposed, there was hypersensitiveness.

A number of charts are given showing graphically the stimulus required in the different parts and conditions to provoke sensation.

Harold Grimsdale.


(11) Ocular lesions of vaccinal origin are comparatively rare, only about 100 cases being on record. Of these, the large majority affect the lids and conjunctivae. Corneal lesions are more uncommon; Toulant has found reports of 24 examples and has knowledge of a few unpublished cases. He now records a typical
instance under his own observation. This occurred in a female who was employed in a laboratory in filling tubes with freshly prepared vaccine, a drop of which splashed into her left eye.

Attention is directed to this communication chiefly because it is appended a bibliography of 38 references arranged in three groups:

(1) Vaccinal keratitis, (2) Vaccinal blepharitis and conjunctivitis, and (3) Pathogenesis of ocular vaccinia.

To any one in search of the literature of the subject this list will be very helpful.

J. B. Lawford.

II.—TRACHOMA


(1) In 1927 Noguchi described the Bacterium granulosis as the cause of trachoma. This was isolated from cases of trachoma among the North American Indians. After the lamented death of Noguchi his work has been continued by Olitsky. It was found possible to inoculate monkeys with human trachomatous tissue as well as with cultures of the Bacterium granulosis. The lesions produced resembled those of Indian trachoma, except that the cornea never showed pannus or corneal trachoma. From the infected animals the organism was again isolated, which again was capable of producing trachoma.

The histological changes of the experimentally induced conjunctival lesions correspond closely with those of human trachoma and include the characteristic follicle and scar tissue formation. The histological appearances which are observed in the excised tarsal tissues from cases of trachoma occurring among the American Indians agree with those described as present in similar materials from recognized sources elsewhere. The statements contained in the last two sentences have been questioned by Mayou and Rowland Wilson.

The Bacterium granulosis has a superficial resemblance to the Bacillus xerosis and other diphtheroids and requires special media for its cultivation. Under certain conditions it is motile. Noguchi and Olitsky have described it as being Gram-negative; however, Morax maintains that if the classical method of staining is carried out it is Gram-positive.

A. F. MacCallan.

El-Kattan considers that trachomatous pannus starts below Bowman's membrane, and not between that membrane and the corneal epithelium. He is supported by the authority of Morax, who says "Tous nos examens nous ont montré la pré-dominance des lésions en arrière de la membrane de Bowman, mais la présence fréquente des infiltrations épithéliales." (Le Trachome, Morax et Petit, Paris, 1929.)

El-Kattan quotes Parsons in support of his opinion, but on referring to Parsons' "Pathology of the Eye," page 198, we read "There is strong evidence that in the early stages the vessels are insinuated between the epithelium and Bowman's membrane, leaving the latter intact."

Up to the present time the best authority on the corneal changes which result from trachoma is Herbert. In the Transactions of the Ophthalmological Society of the United Kingdom, Vol. XXIV, 1904, page 67, Herbert states "Together with the ciliary injection there is a marginal zone of vascular ingrowth all round the cornea. The closely set vessels are distinctly, and at their terminations separately, raised above the corneal surface, and are therefore superficial to Bowman's membrane, passing inwards from enlarged conjunctival vessels."

Dusseldorp (Trachoma, Buenos-Aires, 1927) states that in pannus tenuis the vascular infiltration is situated between the epithelium and Bowman's membrane, which remains unaltered, while in the more chronic stages of trachoma, with pannus crassus, Bowman's membrane is partially destroyed and the infiltration penetrates between the layers of the cornea.

A. F. MacCallan.

Sedan, Jean (Marseilles)—Corneal phlyctens in trachoma. (De la kératite phlyctenulaire chez les trachomateux.) Rev. Internat. du Trach., October, 1930.

Sedan has had a long and important experience of trachoma at Marseilles. He considers the subject under two headings, phlyctenular disease in the cicatricial stage of trachoma. (Stages III and IV), and in florid trachoma (Stage IIa.)

Phlyctenules of the centre of the cornea and also of the upper limbus are very rare. He suggests that the reason the upper limbus is practically immune is that it is always vascularized by the extension in this situation of corneal trachoma. This is an important and probable explanation.

Sedan notes the frequency of rhinitis in all cases of phlyctenular
disease. His experience goes to show that ointments containing mercury are ineffective or harmful, while ointments containing copper are of benefit to the patient.

A. F. MACCALLAN.

(4) Pascheff, Professor (Sofia).—Chronic hyperplasia of the conjunctiva and true trachoma. (Les hyperplasies chroniques de la conjunctive et le vrai trachome). Rev. Internat. du Trach., October, 1930.

(4) Pascheff, who is a voluminous writer on diseases of the conjunctiva, recognizes several conditions which are characterized by hyperplasia of the conjunctiva on microscopical examination. He gives these the names of plasmo-cellular, lympho-cellular, follicular, papillary and hyalinoid. Each of these conditions is divided into several sub-varieties which Pascheff believes himself able to recognize clinically. The sub-variety, which, according to the author, alone is real trachoma, is confluent-folliculomatous follicular hyperplasia.

A. F. MACCALLAN.


(5) Olitsky has been continuing Noguchi’s work on the experimental production of trachoma at the Rockefeller Institute for Medical Research. In the present paper, in which he has had the assistance of Knutti and Tyler, he states that he has been able to bring about a condition in which the clinical appearance of the trachomatized conjunctiva in monkeys can be brought to resemble that of human trachoma, stages IIb and IIc. This is of interest since observations on monkeys with lesions enduring for periods up to three years reveal that, usually, the experimentally induced trachoma retains indefinitely its characteristic resemblance to the human stage I of the disease.

The test animals used were nine Macacus rhesus monkeys showing lesions resembling stage I or stage IIa of human trachoma. This was the result in two cases of sub-conjunctival inoculation with human trachomatous tissue, and in the other seven of inoculation with cultures of Bacterium granulosis. In all the disease had been progressing over a period of from two to seven months before secondary organisms were implanted experimentally upon the diseased conjunctivae. In addition five normal monkeys with clear conjunctivae were used as controls for determining the effects of inoculation of the secondary bacteria alone.
The micro-organisms used for secondary inoculation consisted of some of those usually encountered in the cultivation of conjunctival tissue from trachoma or other conjunctival affections of man and monkey. They were a Gram-positive diphtheroid, staphylococcus albus, Bacillus xerosis, a chromogenic and a spore-bearing bacillus, both Gram-negative, and a non-haemolytic streptococcus.

The method of inoculation was by suspending the growths in the condensation water of the tubes; the turbid growths were removed by means of pipettes and pooled. To the mixture an equal volume of 0.9 per cent. salt solution was added. The application of the culture mixtures to the conjunctivae by daily swabbing over long periods yielded no results either in the monkeys with granulosis lesions or in the controls; even the subconjunctival inoculation of 0.2 c.c. of the mixtures failed in most instances to induce infection.

However, when an equal amount of testicular extract was added to suspensions of the organisms and 0.2 c.c. of the mixture was injected subconjunctivally, and the inoculation repeated three or four times at intervals of three or four weeks, infection resulted. Testicular extract had been used for the purpose of enhancing the pathogenic action of bacteria by other bacteriologists.

The clinical effects were that after a somewhat violent oedema of the conjunctiva and eyelids had subsided the conjunctiva was found to be in a condition of trachoma stage IIb where the typical sago-grain follicles of trachoma are partly masked by a papillary hypertrophy. In some of the cases trachoma stage IIc resulted with a dark red tumefied velvety appearance of the conjunctiva.

In two of the monkeys changes occurred in the uninoculated eye after a period, indicating a natural extension of the trachomatous process from the experimentally inoculated eye.

Pannus and lid deformities due to scar tissue formation have not as yet been observed.

In control monkeys the injection of the bacterial mixture was followed by an inflammatory reaction which, in time, subsided without permanent changes in the conjunctiva.

Olitsky's reports of his researches have great interest. In order that these researches shall obtain the whole-hearted support of trachomatologists of all nations it is necessary for the authorities of the Rockefeller Institute for Medical Research to arrange for Olitsky to proceed to Egypt and to repeat in the home of trachoma his interesting researches. At the Giza Memorial Ophthalmic Laboratory he would be able to obtain from the Egyptian Government, through the United States Diplomatic Representative, full facilities for repeating his experiments.

A. F. MacCallan.
(6) **Vejdovsky (Czecho-Slovakia).**—The surgical treatment of pannus by implantation of buccal mucous membrane. (Traitement opératoire du pannus par l'implantation de muqueuse buccale [procédé de Denig]) Rev. Internat. du Trach., April, 1931.

(6) **Vejdovsky** has had good results in cases of cicatricial trachoma, stage IV, with marked pannus, by carrying out a peritomy of the cornea and implanting between the corneal margin and the retracted conjunctiva a strip of buccal mucous membrane. This is a modification of Denig's operation.

A. F. MACCALLAN

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**BOOK NOTICE**

Stereoskopischer Atlas der äussern Erkrankungen des Auges.


The first two series of coloured stereo-photographs were reviewed in this Journal last year (Vol. XIV, pp. 138 and 427). This third series of 10 deals with a variety of common conjunctival and corneal conditions, and their representation is by no means highly successful. An exception must, however, be made for the two photographs illustrating epithelioma of the conjunctiva and a fungating choroidal sarcoma. These gross lesions show up very well indeed and are but further illustration that stereo-photography in colour has its widest use in essentially cutaneous lesions rather than in the finer, purely ocular affections.

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**OBITUARY**

**NORMAN M. MACLEHOSE, M.B.**

We regret to record the death, at Ayr, on August 30, of Norman M. MacLehose, M.B., after a prolonged illness. MacLehose was a student of the University of Glasgow (his native city) where he graduated in medicine in 1882. He was for a short time in general practice in Kent, but soon decided in favour of special practice. Going abroad he pursued his studies in ophthalmology in Vienna and Berlin, before settling in London. He became a Clinical Assistant at Moorfields Eye Hospital, where he worked in the