be placed upon a scientific footing, it appears essential that a
standard of 'Normal' daylight should be defined, and the degree
of accuracy with which 'Artificial daylight' units for 'various
purposes should approach this standard specified.' He also points
out the necessity for a standard white surface and a standard
nomenclature of colour-tints, for which latter the list prepared by
the Société des Chrysanthémistes in France might serve as a basis.

In the subsequent discussion a communication from the United
States by Mr. M. Luckiesh showed the extensive use that is being
made of artificial daylight in industry in that country. The source
of light described by him are tungsten (Mazda C) lamps equipped
with coloured glass filters.

ABSTRACTS

I.—TETANUS FOLLOWING OCULAR LESIONS

Castelain and Lafargue.—On tetanus consecutive to ocular
lesions. (Du tétanos consécutif aux lésions oculaires.)

Castelain and Lafargue, having found a case of tetanus after
eye injury, give notes of it, together with a considerably detailed
review of the features of the published cases. The soldier reached
their ambulance with a diagnosis of traumatic conjunctivitis, but on
arrival showed panophthalmitis. As it was the rule to give anti-
tetanic serum at once, it was taken for granted that such had been
administered, but no positive note was made that he had had serum
as a prophylactic. While he was striking a horse's shoe in the
cold state, on November 25, 1916, a chip flew up and struck his left
eye, a fragment of metal lodging in the upper part of the globe; thirty-
six hours afterwards he presented exophthalmos, chemosis, oedema of
lids, yellowish opacity of cornea—panophthalmitis of a rapid charac-
ter, calling for chloroform and exenteration of left and extraction of
the foreign body on the 27th. Apart from some chemosis there were
no untoward signs till the seventh day, when, in the presence of
swelling of the face, of difficulty in opening his mouth, of the
symptoms noted by the patient, who said his teeth were on edge, Dr.
Darrieux at once thought of cephalic tetanus and started the necessary
treatment. On the eighth day the diagnosis was confirmed by still
more defined symptoms, viz., complete paralysis of the whole of the
left seventh nerve, contracture of the right face, difficulty in
opening the mouth—trismus, ophthalmoplegia of the right. He
presented the aspect described by Courtois-Suffit: he had loss of
power of muscles of the right eye, drooping of lid hiding most of cornea, and the wounded man, appearing asleep, threw his head back to see out beneath the drooping lid. The forehead was wrinkled, the eyebrow raised. With the lid raised the gaze was altered, the paralysis of the muscles no longer allowing the eye to fix near objects, only a slight outward movement remaining. It was not possible to say whether the left muscles were also paralysed, the chemosis obscuring the movements of the stump. Right pupil in extreme miosis and inactive to light, not possible to say whether any reaction on accommodation. In the present case the facial palsy was the first symptom, the trismus the second, and the ophthalmoplegia appeared later, but all appeared within twelve hours. Towards the twentieth day the muscles of the right eye did not seem more than paresed, the facial contracture was perhaps less marked, and the trismus less intense. In the following days the improvement became more marked, so that the ophthalmoplegia was cured about the forty-fifth day, the facial palsy disappearing some days later.

Although a bacteriological examination was not done, the authors consider the diagnosis of cephalic tetanus seems certain; in the photograph reproduced the risus sardonicus can be seen, profound apathy being shown on the one side of the face and a terrifying frenzy on the other. In the motor oculi paralysis and abducent, paresis, the facial palsy and the trismus, the slowness of pulse, the acceleration of respiration, lies evidence that the toxin had affected the nuclei of the third, sixth, seventh, and tenth cranial nerves. Apparently a bulbar intoxication, and the work of Guillain and Laroche, who have studied the experimental fixation of the tetanic toxin on the masticator nucleus, would be a new proof in favour of this pathogenic theory. Absence of other than cephalic signs in this case may be due to the early and vigorous treatment used, for in many of the published cases time had been lost waiting for the diagnosis to be clinched. Antitoxic and antispasmodic treatment were both used in this case, the former by massive doses, 60 cc. daily, of antitetanic serum given intravenously in the hope of neutralizing the toxin produced, and circulating in the blood (although not operative on the toxin fixed in the nerve elements), the latter by injections subcutaneously of carbolic acid. Employed alone, 6 gramme doses of chloral were without effect, while the carbolic solution showed clearly its efficacy, for the stoppage of it in the course of the disease, from the 7th to the 13th December, was followed by the reappearance of the crises, which ceased on resumption of the carbolic, December 16th. These subcutaneous injections are painless and without reaction; they have no harmful effect on liver or kidney, since the albumen and the sugar that appeared at the start of the illness disappeared in spite of the
continuation of the treatment. Daily he got 1.2 grm. of carabolic acid, i.e., 13.5 grm. in all, without altering the colour of the urine. Of the anti-tetanic serum he had 900 cc. intravenously in 34 days without incident, so that the efficacy and innocuousness of the massive doses of serum and carabolic acid used jointly are well established in this case.

In the 1916 Annales d'Oculistique, Schneider stated that in the literature he had found only 19 cases. Add to these Vinsonneau's case, and Rollet's, quoted by Goëtz in his Lyons thesis, 1916, that makes 21 and the present one brings the grand total published to date up to 22 cases. (The authors have apparently missed Sattler's [Cincinnati] case published in the Trans. Amer. Ophth. Soc., Vol. XV (1917), p. 234, abstracted in British Journal of Ophthalmology for March, 1919, p. 124).

Four full-page tables are given with the following points in the published cases, author, cause, primary lesion and its complications, date of appearance of the first sign of tetanus, operation done, final result.

In nine cases the injury was the stroke of a whip, in three gunshot, in eight by objects presumably contaminated by earth contact, viz., pitchfork, arrow, reed grass, chip of iron, chip of glass—an earthy or equine origin is thus evident in the majority of cases. In 18 cases the primary lesion is indicated, in 13 wounded there have been corneal lesions, of these 10 were penetrating, no details in the other three; also three penetrating wounds of globe, two of sclerotic, and 1 (Vinsonneau's) of conjunctiva. Apart from the iritis as noted by Rust in his case, the most common complication has been panophthalmitis—18 times, suggesting that panophthalmitis is a necessary condition for the bacillus of Nicolaier. One is also struck by the rapidity of the appearance of this complication, since in 12 cases where this point was noted we have three cases on the second day after the injury, six on the third, one each on the fourth, sixth, and eighth day. Apart from the cases of Dénué and of Mauch, in which details are wanting, the period of incubation appears to be most often six to seven days, but in the Ramiro-Guedes case trismus appeared on the third day, and in Schneider's tetanus first showed on the 13th day. The evolution is usually the same—towards the sixth or seventh day after the accident one notes trismus, difficulty in swallowing, and facial paralysis on the same side as the lesion, i.e., cephalic tetanus, the syndrome of Rose. In 17 cases where the order of appearance of the symptoms is noted, trismus is generally the first, facial palsy appearing shortly after, preceding it in only three cases. Ocular palsies were noted in six cases, either on the side of the lesion or on the other, and either bilateral at the onset or only later, the motor oculi being the affected nerve, partially or completely. In Schnitzler's and the present case paresis
of the sixth nerve was also present. Generally the tetanus spreads beyond the cephalic type of Rose; about three days after these signs appear, the generalized nature of the affection is evidenced by spasms of the limbs and unfortunately in too many cases, 18 in the series, death ensues, the prognosis being worse the earlier the onset. In the successful cases the cure was reached in about one month; of four cured cases three had had enucleation while all the 10 enucleated cases died. Other factors have to be considered, but all the non-fatal cases were operated on early, second, third, and fourth day, while one enucleation done on the fifteenth day died, as also enucleation cases done on the fourth, fifth, sixth, eighth, eleventh, fourteenth days. In half the cases no note is made as to the treatment given, but in six cases where it says serum was injected no note is made of quantity, channel, or date. Several of these cases died so soon that no conclusion can be drawn as to the value of this treatment.

The authors give the following guiding principles; in penetrating eye injuries from gunshot, pieces of glass, and chips of metal, in which latter the metal may have had contact with the soil of the workshop, one should carry out, always and as early as possible, an injection of 20-30 cc. of anti-tetanic serum; secondly, if by the second or third day there is any appearance of panophthalmitis, perform enucleation at once and frequently irrigate the socket with peroxide; thirdly, if, in spite of these preventive means, one finds later trismus, difficulty in swallowing, and facial paralysis, it is necessary to make forthwith daily intravenous injections of 60 cc. of serum and simultaneously subcutaneous injections of the same quantity of 2 per cent. carbolic acid, which appears to have an analgesic and antispasmodic effect. 15-20 days of such treatment may reasonably be expected to prevent generalized tetanus and gradually lead the way to a cure.

W. C. Souter.

II.—EYE LESIONS DUE TO POISONOUS GASES


(1) Rathnakar reports from Dr. Hill Griffith's clinic the case of a soldier, a signaller, who, after being gassed, developed nystagmus. Griffith had previously seen two other cases, but, being sceptical as to their freedom from nystagmus prior to the gassing, took no particular note. In the present case Griffith seems to have been satisfied that the patient had not previously suffered from nystagmus, since, previous to joining up, he had been a microphotographer at
one of the largest London hospitals and had had excellent vision. The nystagmus was of the lateral variety, constantly present, but more marked on extreme outward and inward movement. Fundi normal. Retinoscopy under atropin + 1D. V.A. 6/18 partly, not improved by glasses. Fields normal. Three months later the condition was unchanged.

**ERNEST THOMSON.**


(2) The value of Derby's communication is enhanced by the fact that it is illustrated by six coloured and three black and white pictures of the lesions of the eye produced by poisonous gases, reproduced by the courtesy of the Medical Research Committee of the British War Office. Among the gases first (1915) used by the Germans the so-called "lacrimary gas" did not cause more than temporary lesions of the conjunctiva, which even in the more severe cases usually recovered within two weeks. Much more serious were the injuries produced by mustard gas (dichloethylysulphide), first used extensively at Ypres in 1917. It caused, after a delay of a few hours (two to six), painful irritation of the eyes and sometimes vomiting, and in those severely affected (about 20 per cent. of the whole) considerable redness and swelling and the formation of bullae of the skin of the eyelids. The conjunctiva was markedly injected, and might show a considerable degree of chemosis, especially in the culs-de-sac, upper and lower. The region of the palpebral fissure was most severely affected, and in badly burned cases there was often an area of solid white oedema in the palpebral aperture, which presented a very striking and characteristic appearance. The corneal lesions varied in severity. In the milder cases there was a very slight roughening of the corneal epithelium, which might or might not stain with fluorescein. In moderately severe cases there was a marked roughening of the epithelium, with irregular greyish areas of opacity scattered throughout the cornea, an appearance likened by the British to that of an orange skin. In the most severe cases a saturated grey band, sometimes of almost porcelain-like whiteness, traversed the cornea in the region of the palpebral fissure. Secondary infection might result in ulceration of the cornea or later even in panophthalmitis and loss of the eye. But fortunately the last-named condition was rare. The British observed only about ten cases of corneal ulceration which impaired the sight of the eye. Teulières saw among 1,500 cases one instance of panophthalmitis and three instances of ulceration of the cornea. The lesions of mustard gas are in the nature of a chemical burn of the tissues of
the eye. Pissarello has exceptionally seen cicatricial ectropion follow burns from mustard gas. Sir William Lister states that occasionally the actual liquid (the gas in its original form is fluid) from the shell in which it is contained passes into an eye, and then produces results similar to those caused by other liquid caustics. It is unlikely that disease of the posterior half of the eyeball, as neuro-retinitis, follows exposure to mustard gas.

**Pathology**

The Americans had no provision up to the time of the Armistice for the pathological examination of gassed eyes, so that Derby quotes from one of Sir William Lister's reports dealing with the matter. From that report it appears that such eyes showed changes in the corneal epithelium, the substantia propria, and the conjunctiva. The changes in the corneal epithelium included diminution in the thickness or actual exfoliation and exposure of Bowman's membrane. In some cases the substantia propria showed an infiltration with round cells between its layers. In the ocular conjunctiva granular masses were present in the subepithelial tissue, which probably corresponded to the solid white exudate mentioned before.

**Experimental Work**

The communication includes an account of important experimental work carried out by Warthin and others, chiefly upon dogs and rabbits, respecting the effects of mustard gas upon the eyes. These experiments were of two kinds: (1) Mustard gas was applied with a fine pipette directly to the centre of the cornea in uniform minute droplets, and (2) animals were exposed to the vapour of the gas. Fifteen minutes after the gas was applied congestion of the upper palpebral conjunctiva was noted, and in one hour the conjunctiva had become oedematous, until, finally, there was a rim of swollen conjunctiva about the cornea. Corneal changes occurred in five or six hours, and consisted in faint clouding, roughening, and irregularity; in eight hours the cornea was porcelain-white and there were irregular, rounded areas devoid of epithelium. The denuded area of the cornea increased in size, and the lower half often showed an opaque band running horizontally. Pus in the anterior chamber was sometimes met with. During the second week the corneal opacity remained without alteration, but the exudate decreased somewhat. During the third week a sluggish reparative process began. Ectropion of the lower lid was noted. Warthin found that changes varied enormously with the presence or absence of treatment, especially by a one-half of a 1 per cent. solution of dichloramine—T in chlorcosane. If no treatment was adopted purulent panophthalmitis often developed within three
weeks, and the eyes were destroyed within six weeks. The panophthalmitis was due entirely to secondary infection. Microscopically, the earliest changes in the cornea consisted of pyknosis, contraction of the epithelium and of the substantia propria, most marked at the corneal vertex, extending down to Descemet's membrane. This was followed by a loss of nuclei, until by the twelfth hour the apex of the cornea showed complete necrosis. Desquamation of the epithelium and polynuclear infiltration of the sclero-corneal junction began in about five hours. The earliest signs of regeneration of the substantia propria of the cornea were noted at the end of 65 hours, and continued for several weeks, with development of a highly vascularized corneal cicatrix. The severity of the corneal lesion was in direct proportion to the concentration of the gas and the period of exposure. As the result of secondary infection, iritis and irido-cyclitis were common at about the third to sixth week, but they occurred only in the uncared-for cases. Meyer (who discovered mustard gas) stated that by its injection he had produced a metastatic conjunctivitis, but in eight animals Warthin failed to verify this conclusion. Great differences have been observed in individual susceptibility. Marshall, Lynch, Smith and Williams, of the Medical Division of the Chemical Warfare Service, found that as regards the skin, 20 per cent. to 40 per cent. of the white men tested showed a certain degree of resistance, while 78 per cent. of the negroes tested, manifested a similar resistance. Individual differences in sensitivity were also noted in experimental animals. It is suggested that hypersensitivity to mustard gas may occur in those who show the picture of a persistent thymus and characteristic hyperplasia.

Treatment

The eyes should be washed out after exposure to gas with a 1 per cent. solution of sodium bicarbonate and later with a lukewarm solution of boric acid, salt, or sodium bicarbonate, and this should be followed by the instillation of a drop of oil, of which the best was found to be liquid albolene. The eye should never be bandaged. When there is much blepharospasm and irritation, atropin (1 per cent. or stronger) should be used, and the patient be supplied with a shade or a pair of dark glasses. When secondary infection takes place a weak antiseptic solution, as argyrol or protargol, was found to be of benefit. Septic ulcers of the cornea should be treated as in civil life. The patient should be sent outdoors as soon as may be and given light duty, mainly with a view to combat the possibility of the beginning of a neurasthenic tendency. Cocain should be banned.

S. S.
III.—MIXED TUMOURS OF THE LACRIMAL GLAND


Birch-Hirschfeld describes a case of this kind in a man 57 years of age who had observed for four years a prominence of one eye. There was marked displacement of the globe forwards and downwards, total absence of movement upwards and outwards, diminution of vision, hypermetropic astigmatism, and slight hyperaemia of the optic disc. He removed the tumour by Krönlein's operation. After a few months the position of the eye, its movement and vision were completely restored, while the astigmatism caused by the pressure of the growth on the globe had disappeared. Six years after the operation there was no sign of recurrence of the tumour or metastasis. The new growth was examined microscopically, and his findings are described in detail.

A study of this case led the author to make a critical survey of similar cases so far as the description of the different writers justified, in his opinion, their inclusion in this class—he collected 75 cases recorded in the literature on the subject to which he had access—and the result of this review is embodied in the following conclusions:

1. A considerable number of the new growths found in the lacrimal gland and its immediate neighbourhood, and described under a great variety of names may be grouped together in one class under the general term of "mixed tumours."

Birch-Hirschfeld comments on the frequent difficulty, or even impossibility, of determining the exact point of origin of these new growths, and hence believes that many cases have been recorded as tumours of the lacrimal gland which had no connection whatever with it, while others, true cases, have been reported merely as tumours of the orbit.

2. Histologically these tumours are distinguished by their very complex structure. They contain cells of epithelial character arranged in the form of glandular lumina, or reticular bands, or solid processes. Morphologically these cells are in parts absolutely identical with true epithelium; a basement membrane, typical intercellular bridges, and sometimes, too, signs of cornification can be observed. The variability in the relation of these parenchyma cells to the surrounding stroma, which at one time shows myxomatous or hyaline degeneration and at another contains islands of cartilage, produces a picture that in many places closely resembles an endothelioma, in others typical cylindroma, in other parts again adeno- or chondro-myxoma.
3. The view of the epithelial character of the parenchyma is a more probable one than that of their endothelial origin; and the author has been led to this conclusion in great measure by the study of mixed tumours of the salivary glands to which the lacrimal growths bear a very close resemblance.

It is this complex structure with the varying arrangement and shape of the cells, the changes of the stroma, and the variation in the relative preponderance of cells or stroma, that has given rise to the great diversity in the reports of different writers and to the bewildering confusion in the terminology of these growths. The question of the origin of the cells is one on which there is great difference of opinion, a similar difference being found among pathologists with regard to tumours of the salivary glands. It may be noted that Parsons ("Pathology of the Eye," Vol. II, p. 752) distinctly favours the endothelial origin of the parenchyma, and regards these neoplasms as almost identical with the mixed growths of the salivary glands, which are generally held to be endothelial: he pertinently points to the occurrence of cartilage in the tumours as difficult of explanation on the theory of an epiblastic origin. Birch-Hirschfeld, however, as stated, takes the opposite view, and according to him there is, on the Continent at least, a considerable weight of opinion in favour of their epithelial character.

4. Clinically, these tumours are at first of a very slow growth, but they may suddenly take on a much more rapid development and become malignant, inasmuch as they may lead to local recurrence and the formation of metastatic growths.

5. The early and complete removal of the tumour is therefore indicated, and this should be carried out as far as possible with the help of blunt instruments.

6. As regards the origin of these mixed tumours in the lacrimal and salivary glands, it is very probable that they are due to a displacement of the embryonic tissue through some disturbance in the process of development (possibly in the third month of foetal life, when—in the case of the lacrimal gland—the embryonic cells come into relation with the primitive cartilage of the frontal bone).

Thomas Snowball

BOOK NOTICES

(1) Une Échelle de Clarté. (2) Moyens de Contrôle de Verres de Lunettes et de Systèmes Optiques en général. (3) La Théorie de Gauss. By M. Tscherning. (Mathematiskfysiske Meddelelser, 1918-19.)

These are three interesting papers by the well known professor