CONJUNCTIVITIS DUE TO EXPOSURE TO
DIMETHYL-SULFATE*

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A WORKER in a pharmaceutical laboratory presented himself complaining of bloodshot eyes which had existed for six days. He hardly felt any discomfort apart from an occasional slight itching; no lachrimation or secretion were present.

On examination both eyes were found to be bloodshot, the bulbar conjunctiva being injected only in the area exposed to the air. Neither the palpebral conjunctiva nor the bulbar conjunctiva normally covered by it showed any changes. The line of demarcation between the hyperaemic and the normal bulbar conjunctiva was rather sharply defined. The cornea was normal. Apart from the hyperaemia, the slightly oedematous conjunctiva had a peculiar opaque aspect, the superficial vessels only being clearly visible. Especially on the slit-lamp this opaqueness of the bulbar conjunctiva was striking.

A conjunctival smear did not show any organisms. A drop of adrenalin solution 1:1000 reduced the congestion considerably and the conjunctiva took the aspect of a opaline glass.

The clinical picture—hyperaemia and infiltration of the exposed bulbar conjunctiva—together with the information as to the occupation of the patient, suggested a chemical agent as the cause for the condition. This substance would probably be present in the atmosphere in the form of a vapour or fume; dust would be washed into the inferior fornix and exert its irritating action there, while the fornix was entirely normal.

The patient had been engaged in work entailing the use of dimethyl-sulfate, a substance which is used to introduce the methyl group into certain chemical compounds.

Dimethyl-sulfate $(\text{CH}_3)_2\text{SO}_4$, is a colourless, heavy oil which has a boiling-point of ca. 188°C . Direct application to the skin produces a very intensive reaction, and its vapours are known to have an irritative effect on the mucous membranes. Prolonged exposure to it may cause serious nervous symptoms.

The noxious effect of dimethyl-sulfate on the eyes has been subject to a number of publications at the beginning of this century.

Weber¹ was the first to recognize its toxicity and published three cases: two were workers who had been exposed to dimethyl-sulfate fumes in the course of their work; one of them died from lung

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complications. The third one was a chemist who had upset a bottle of the substance on his clothes and had suffered severe burns. All three cases showed a violent conjunctivitis, the first one with necrotic patches on the palpebral conjunctiva. No corneal involvement was noted. Weber experimented on some animals and found that dimethyl-sulfate rubbed into the skin caused local burns and a mild irritation of the eyes due to the fumes. Inhalation of the fumes caused watering of the eyes after 10 minutes; after $1\frac{1}{2}$ hours the conjunctiva was violently inflamed and the corneal tissue had become opaque. Ingestion of the substance did not cause any eye symptoms.

Erdmann² published the case of a chemist who displayed a violent conjunctivitis after having been exposed to dimethyl-sulfate fumes. While other workers had remained unaffected, he suffered from a marked reddening of the tarsal conjunctiva and a violent injection and oedema of the bulbar conjunctiva. The cornea showed some fine, greyish opacities in the area of the lid aperture. After 24 hours the cornea was opaque and the epithelium became detached in big vesicles. The condition receded slowly and the cornea became entirely clear, but with the corneal loupe some fine opacities remained visible.

The same author³ published some more cases all of which showed irritation of the tarsal and bulbar conjunctiva; some of them displayed also corneal complications.

Adams and Cridland⁴ published another case of a chemist who had started to complain of ocular symptoms some four hours after having been exposed to dimethyl-sulfate fumes and was still displaying irritable and watery eyes after three weeks when he was first seen. The ocular conjunctiva in the palpebral aperture was much injected and considerably oedematous. The palpebral conjunctiva was normal and the corneal epithelium sound, but there were some keratic precipitates present in both eyes. The patient suffered from a loss of taste and smell, and there was a doubtful contraction of the visual fields. The patient recovered entirely within three months. The authors assumed the presence of an affection of the cranial nerves because of the neurological signs.

The case published here resembles most the last one but seems to have been milder still as he presented neither the keratic precipitates nor the neurological complications of the previously quoted case. The patient was engaged in supervising a process in which dimethyl-sulfate is dropping slowly into a container in which the substance to be methylated is stirred electrically and develops a considerable temperature. The fumes of dimethyl-sulfate seem to have been responsible for the conjunctival irritation. The mildness of the symptoms and the fact that the patient did not connect his

eye condition with his occupation made the diagnosis difficult. Only the peculiar localization of the conjunctival irritation in the area of the lid aperture made it possible.

The patient was advised to stop working with dimethyl-sulfate, and the condition improved considerably. When he started after a few days to work with the substance the condition appeared again. Treatment with bland lotions and ointments failed to bring relief but bathing of the eyes with borax solution, which neutralizes the substance, improved the bloodshot appearance and itching of the eyes. Changing over to a different job brought about complete cure. It seems worth mentioning that, as in the case published by Adams and Cridland, other workers in the same laboratory who had previously done exactly the same job had never been affected.

REFERENCES

1. WEBER.—*Arch. f. Exp. Pathol. und Pharmac.*, Vol. XLVII, p. 113, 1902.
2. ERDMANN.—*Arch. f. Augenheilk.*, Vol. LXII, p. 178, 1909.
3. ———— *Arch. f. Augenheilk.*, Vol. LXIV, p. 245, 1909.
4. ADAMS AND CRIDLAND.—*Ophthalmoscope*, Vol. VIII, p. 713, 1910.

ANNOTATION

Patron Saints of the Eyes

An abridged reprint of the paper entitled as above, by Koch, is published in the Supplement to the Sight-Saving Review, 1944. The original was the author's thesis for membership of the American Ophthalmological Society and appeared in February last year. Here is given the lore of some of those saints who, in the middle ages, were, canonized for miracles in connexion with sight. These saints are four in number: St. Lucy, St. Odille, St. Clair and St. Augustine of Hippo. St. Lucy was a virgin martyr of Syracuse, born c. 283 A.D. Her name was invoked principally by those suffering from external diseases of the eye. The legend of St. Odille should be familiar to those who know the Ingoldsby Legends. In this paper she is said to have been born to Adalric, Duke of Alsace and his wife. Odille was born blind c. 660 A.D. and narrowly escaped being put to death by her irate father. She is reputed to have recovered her sight during adolescence, became a nun and later the Abbess of a convent where she lived in the odour of sanctity for nearly a century. Both St. Lucy and St. Odille are commemorated on the same day, December 13th.

St. Clair, whose day is November 4, was a priest and martyr of the IXth century. He is invoked, for the most part, by those in Northern France, in cases of ophthalmia. There are other Saint