

## Miscellanea

### Hazy Vision in Amine Plant Operatives

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The action of several amines suspected of causing hazy vision in humans has been studied in rabbit eyes. The disturbance appears to be brought about by a direct action of the amine on the cornea. It is recommended that workers exposed to this hazard should be warned that hazy vision is but a forerunner of a more serious condition.

Reports of blue or grey vision (glauropsia) among workers in chemical amine plants have appeared in the literature from time to time (Amor, 1949; Kipling, 1965). The symptoms are reminiscent of the appearance of objects through a haze of cigarette smoke. The amines may be pictured to act in one of two ways—either the effect is systemic or the amine vapours act directly on the eyes, this latter being the more attractive hypothesis. The action of the following five amines, which had caused complaints, was studied in rabbit eyes (there being no guarantee that other amines might not also be implicated): *n*-ethyl piperidine, *n*-methyl morpholine, *n*-ethyl morpholine, tetramethyl ethylenediamine, and dimethylamine.

One drop of the pure amine (all liquids) was instilled into the eye of an anaesthetized rabbit, and the lids were then lightly clamped to avoid desiccation of the cornea. After five minutes the eye was examined and photographed. Initially all the amines produced blinking reactions, and after five minutes the inner surfaces of the lids and the nictitating membrane were seen to have reddened, *n*-ethyl morpholine, tetramethyl ethylenediamine, and *n*-ethyl piperidine having the greatest effect. The latter amine caused some small haemorrhages.

All the amines attacked the cornea and caused 'haziness', irregularities and sloughing of the surface, and the general appearance associated with violent desiccation. Dimethylamine caused the cornea to become whitish-blue and translucent in a few seconds, and after one minute it had the appearance of scleral tissue (Figure).

The alternative systemic hypothesis would

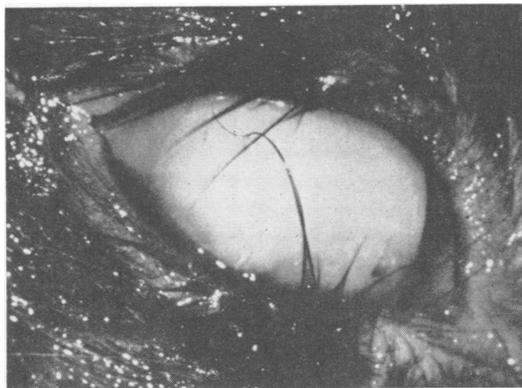


FIGURE. A rabbit cornea one minute after the application of dimethylamine. The cornea has turned a translucent bluish-white (reproduced from a colour transparency).

involve quantities of amine vapour being inhaled and it, or its products, being transported to the eye, there to upset normal function. If this were the case, one would expect the amine in the bloodstream to cause other side effects, but none has been reported, at least with such reversible reactions as blue vision.

The experiments described above confirm the view that amine vapour attacks the cornea directly, the 'haziness' caused by damage to the corneal epithelium being due to the Tyndall effect (light scatter) of the denatured proteins. In human patients who have been exposed only to the amine vapours, examination a few hours after the onset of glauropsia does not show any striking changes in the eye, but presumably the damage is much less than that noted in the above experiments and is reversible. In any case, the effects of light scatter

in the corneal epithelium would probably be noticed by the sufferer before it could be seen by an examining ophthalmologist.

It seems advisable for exposure to these amines to be minimized. In our opinion, the attention of workers exposed to this hazard should be firmly drawn to the type of haze that heralds the reversible stage of the condition.

We should like to thank Dr. M. D. Kipling, H.M. Medical Inspector of Factories, Birmingham, for bringing this problem to our attention, and Dr. W. T. Jones for providing samples of the amines used.

#### REFERENCES

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## The Future of an Occupational Health Unit in Khartoum University, The Sudan

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A brief geographical and economic review of the Sudan has been attempted. Occupational health problems of the present and future have been outlined. The potential and intended functions of an occupational health unit are defined. The importance of teaching, surveying industry, and research is stressed.

The Sudan is a zone of steppe extending west of the River Nile to rise in the extreme west as volcanic hills of Jebel Marra, 5,000 to 6,000 feet high, and to form the Red Sea Hills in the east which are part of the Rift Valley and link up with the Ethiopian Highlands.

The climate differs in each region. In the Red Sea Hills the winter is wet and the humidity high. In the northern region desert conditions prevail; there are two seasons only—hot, dry summers and cold, dry winters. The southern part is a region of tropical forests which has a long wet season from March to November. The central region, which includes Khartoum, has a sub-tropical, continental type of climate with four seasonal changes, and the temperature varies throughout the year between 50° and 105°F.

The climate influences the type of vegetation and agricultural crops. Of the 600 million acres, 120 million are suitable for agriculture and another 80 million for stock-raising; however, only 15 million acres are under cultivation.

In 1951 the Sudan was divided into nine provinces each with its own elected council. The provinces are further divided into districts, each having a rural district council or a town council.

### Population

The Sudan is inhabited by approximately 13 million people. The birth rate is 48 per 1,000 and the death rate 20 per 1,000. Thus the population is increasing yearly by 2.8% and is expected to reach 25 million in 1990. The expectation of life is 40 to 50 years. As the birth rate is high and the expectation of life is short, the population pyramid is quite steep, as expected in a developing country (Table I).

Ethnologically the Sudanese are a product of Hamites and Negro people—the result of the Arab invasion of Nubia from the north in the seventh century. The Arabs are predominant, Arabic being the language of the 10 million people of the north.

Only 15% of the population live in towns; the remainder is a rural population whose chief occupation is agriculture. Illiteracy is high.

### Economics and Manpower

In the last 10-year plan the economic growth was estimated at between 7% and 8%, which is fair for a developing country provided it can keep pace with the population growth. The average income is low but varies greatly for persons in different occupations.