

ing a well-circling precipitation band at its own distinctive dilution. When conditions are suitably chosen the two end-points may appear on a single plate.

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Irradiation of Thiourea: Effect of Dose-rate upon the Chain Reaction

THIOUREA in aqueous solution is known to exert a highly protective power in radiation experiments¹. When thiourea is irradiated with X-rays, gamma-rays or electrons, free sulphur is liberated².

A quantitative investigation of this reaction reveals interesting and unusual features. Apart from dependence upon pH and concentration and certain shifts of the pH in unbuffered solutions, oxygen has a greater effect than in other oxygen-dependent reactions. The yields, which are very low in absence of oxygen, are increased about four times in air-saturated solution and increase further to twelve times for oxygen saturation at dose-rates between 400 and 1,000 r./min. The most important characteristic, however, is that this reaction is a chain reaction with a very marked dependence upon dose-rate.

When the logarithm of G_s (number of sulphur atoms per 100 eV. of energy absorbed) for various dose-rates is plotted against the radiation dose, a family of curves results which have the following characteristics: there is an induction period during which the G_s values increase to a maximum and then remain constant when the radiation dose is further increased. Each dose-rate has its own maximum G_s value, which is the greater the slower the dose-rate (for example, 17,000 for 0.71 r./min.). The attainment of the maxima is shifted towards bigger doses with decreasing dose-rates. It is in practice scarcely possible to reach the maximum experimentally at very low dose-rates, because the radiation times required would be inconveniently long. The value of the maxima can, however, be satisfactorily extrapolated since the results for medium and higher dose-rates establish that G_s is nearly inversely proportional to the dose-rate (see Fig. 1).

The presence of oxygen is necessary for the chain reaction to occur. Lowering the oxygen tension from 100 per cent oxygen in the gaseous phase to 20 per cent causes a decrease of the G_s values but does not abolish the dose-rate effect. No after-effect of the irradiation has been observed.

The importance of this reaction, if other similar examples can be found, would appear to lie in the fact that the efficiency of ionizing radiations at very low dose-rates, as may occur with radioactive fall-outs, may be much greater than they are thought to be

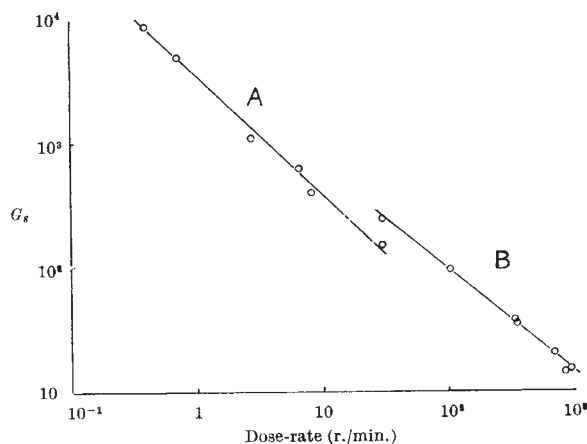


Fig. 1. Curves plotted for: (A) Total dose 10^4 r. before maximum G_s ; (B) total dose 3×10^4 r. at maximum G_s .

at present. A short summary of part of the results of this investigation is in the course of publication in the proceedings of the International Conference on Radiobiology held in Cambridge (August 14-17, 1955), and a full account with experimental details will be published elsewhere.

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Rhythmic Biting Activity of Certain East African Mosquitoes

In a recent communication in *Nature*, Corbet and Tjønneland¹ have described bimodal flight activity in East African Trichoptera, with peaks of activity just after sunset and before sunrise. A similar pattern is apparent in the biting cycle of various forest mosquitoes, and some years ago I introduced the term 'oo-crepuscular' to describe this type of activity².

In most of the more specialized mosquitoes the pattern of biting activity is repetitive from day to day and in addition many show a marked preference for a particular level, such as the forest canopy³. Though the biting cycles of most common species have now been studied in some detail, the reasons for these activity patterns are still, in many cases, not fully explained. It is therefore a matter of considerable interest to find a close correspondence between the biting cycle of a common mosquito, *Taeniorhynchus* (*Coquillettidia*) *fusco pennatus* Theo., and the flight rhythm of *Cheumatopsyche* sp. nov. as shown by Corbet, more particularly as the methods of capture were entirely different and as the cycle shown by the mosquito is related to biting activity, whereas the caddis fly probably feeds little if at all in adult life.

The results shown here for *T. fuscopennatus* (Fig. 1) are taken from a long series of 24-hr. catches now in progress in a patch of forest near Entebbe, Uganda, about sixty-five miles south-west of Corbet's catching station at Jinja. These catches of biting females are being carried out 65 ft. above ground, in the forest