

Effect of X-Rays on Carboxypeptidase

In a recent review¹ of the biological action of X- and gamma-rays, the conclusion is reached that only enormous doses of X-rays have an appreciable destructive effect on enzymes and that enzymes therefore play no important part in explaining the effect of X-rays on living tissues.

I have examined the effect of X-rays on crystallized carboxypeptidase² (substrate : edestine) with the following results.

The percentage destruction is a function of the concentration of the enzyme for a given dose of radiation. A definite amount of radiation energy absorbed corresponds to a constant amount of enzyme destroyed. In consequence, the percentage destruction increases as the concentration of the enzyme decreases : for example, if the concentration of the enzyme is 0.0080 (C.P.u) PDE per ml., 50,000 r. will destroy 21 per cent, 150,000 r. 50 per cent and 400,000 r. 65 per cent. However, if the concentration is 340 times lower, then 50 r. will destroy 29 per cent, 140 r. 50 per cent and 400 r. 70 per cent.

This shows that the concentration of enzymes has to be taken into account if statements regarding their radio-sensitivity are made. It shows, furthermore, that X-rays have a qualitatively uniform effect on the enzyme over the whole range of doses, from very small doses to doses a thousand times as large. This point is of importance in view of the opinion held by many that small doses act in an essentially different way from big doses.

Finally, I have found that X-rays have no effect at all on the enzyme carboxypeptidase when it is

combined with its substrate during irradiation, whereas the enzyme simultaneously irradiated without its substrate showed 85 per cent destruction.

Details of the work will be published elsewhere.

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May 15.

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¹ Scott, C. M., Medical Research Council, Special Report Series No. 223 (1937).

² Anson, M. L., *J. Gen. Physiol.*, **20**, 781 (1936-37).

"Books in War-Time"¹

IN the libraries books are divided into two great classes : fiction and non-fiction. Nine tenths of the fiction published is of such poor quality that it could well be spared in war-time, whereas publications on non-fiction nearly always contain something of value. Good fiction is valuable and should not be discouraged, but a reduction of the present enormous volume of bad novels would give the few good ones a better chance of recognition. The Government might therefore consider whether the allotment of paper for fiction might not be cut by 90 per cent whilst allowing full supplies for non-fiction, which would be sufficiently handicapped by rising prices.

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May 23.

¹ NATURE, **145**, 719 (1940).

Points from Foregoing Letters

S. E. Sheppard, R. H. Lambert and R. D. Walker find the necessary and sufficient conditions for optical sensitizing of silver halides by dyes to be : (1) planar configuration of dye molecule ; (2) edge-on adsorption of dye ion or dipole ; molecular plane orthogonal to a (110) plane of silver-halide crystal ; (3) electronic transition in dye ion or molecule on absorption of light polarized in azimuth, defined by (1) and (2).

A new apparatus has been used by R. S. Vincent for measurements on the cohesion of liquids. A metallic bellows is employed for applying tension to the liquids, and it has been found that the maximum tension which can be applied is simply related to surface tension and vapour pressure, and that the effect of temperature can be largely explained by the changes in these properties.

H. M. Powell and D. Clark show that phosphorus pentabromide has a crystal structure entirely different from the pentachloride. A constitution analogous to $[\text{PCl}_4]^+ [\text{PCl}_6]^-$ is no longer stable owing to the larger radius of the bromine but an ionic structure is formed containing $[\text{PBr}_4]^+$ and Br^- ions.

A study by J. N. Mukherjee and N. C. Sen Gupta of the variation of several properties of dilute solutions of hydrogen bentonites with concentration suggests that aggregate formation in bentonites begins at a very low concentration. At a somewhat higher concentration these aggregates form some sort of a structure and a yield value develops.

The total energy absorption of biological objects subjected to X- or gamma-rays has been investigated by the construction of 'isodose surfaces' for the tissue. W. V. Mayneord describes results that have been obtained.

B. Elazari-Volcani reports that he has found seventeen species of algae in material obtained from sediment from the bottom of the Dead Sea. Photomicrographs are submitted.

P. J. Deoras, working on the internal anatomy of six families of adult Trichoptera, finds that the trend of evolutionary development has been towards reduction and simplification of structure associated with a tendency towards non-feeding in the adult and the shortening of life. Further, there has been a marked differential intra-organic evolution.

As the result of a survey of the damage caused by the severe winter just passed on British oyster beds, H. A. Cole has found that virtually the entire stocks of Brittany relaid oysters (*Ostrea edulis*) on the Essex and Kent beds, probably amounting to thirty millions all told, have been destroyed, while the stocks of native oysters have been reduced by about 75 per cent.

W. M. Dale has exposed solutions of the crystalline enzyme carboxypeptidase to X-radiation. He finds that the percentage destruction of the enzyme is a function of its concentration, increasing as the concentration decreases.