

The evidence adduced above seems consistent with the view that infra-red radiations in the amounts used in the present experiment have no visual stimulus value for the animal's dark-adapted eye, and are subjectively equal to darkness for the cat.

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Analogous Effects of Radiation and Trypan Blue on Rats Resistant to Transplanted Hepatoma

In the course of an experiment on the radiobiology of the liver carcinoma of the rat induced by butter-yellow, an attempt was made to transmit the auto-genous tumour by transplantation into the sub-cutaneous tissues of young animals of the same strain. The strain of albino rat used as hosts was not, however, sufficiently homogeneous, and a high percentage of spontaneous regressions occurred in these animals in spite of repeated passage. A group of resistant rat hosts was thus obtained in which the inoculated tumours had grown for about a fortnight, and then rapidly regressed to small, barely palpable nodules. In view of the known ability of total body irradiation¹ and trypan blue² to depress the host's resistance to tumour, these animals were divided into four groups, one of which was treated with total body irradiation (central body dose: 525 r., 240 kV., HVL 1.5 mm. copper); in another, each animal was injected sub-cutaneously with 2 ml. of a 0.5 per cent aqueous solution of trypan blue; a third group was placed on the standard hepatoma-inducing butter-yellow diet, and a fourth group used as controls.

In both the irradiated group and that receiving trypan blue injection, the tumour remnants recommenced growing vigorously and progressively in every case and, in the ensuing four months, they ulcerated through the skin, necessitating the destruction of the animals. At autopsy, the homoplasts were found to be actively infiltrating skin and subcutaneous tissues but without distant metastases. An additional feature was the tendency in both groups to chronic infection and infestation, as evidenced by bronchiectatic lesions of the lung, cysticercosis of the liver, and splenomegaly with microscopic features reminiscent of Rosenthal and Zohman's description³ of *Bartonella muris* infection induced by reticulo-endothelial blockade. In contrast to this, both the group on the butter-yellow diet and the untreated control group showed none of the infective features, and exhibited complete regression of the nodules with no recurrences during a six-month observation period.

It is concluded, first, that these stock albino rats are not normally susceptible to transmitted hepatoma chemically induced in the same strain, and secondly,

that this resistance may be completely overcome by a single injection of trypan blue or a single sub-lethal exposure to total body irradiation. This fact, which re-emphasizes previously established observations, may be of value to other experimenters desirous of transmitting tumours normally non-transmissible.

In view of the agreement between this observation and Ludford's original findings, it is not improbable that trypan blue, by deranging some resistance mechanism, may eventually activate and disseminate latent spontaneous tumours (by no means infrequent in the rat species⁴), and render the rat host susceptible to chronic infections, including bartonellosis and cysticercosis, the latter of which is known to induce sarcoma⁵. Recent reports on the alleged carcinogenic action of trypan blue⁶ should therefore be treated with reserve.

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Electron and Photomicrographic Studies of the Flagellate Form of *Leishmania donovani*

THE technique of shadowing specimens with metal vapour in high vacuum is now a frequent practice in electron microscopy¹. The same technique may also be used with advantage in photomicrography, in order to bring out details of surface structure which are otherwise invisible. The present work is a study of the flagellate form of *Leishmania donovani*, the parasite of kala-azar, both with electron and shadowed photomicrographs.

Fig. 1 is a photomicrograph of this parasite fixed and stained in the usual way with Leishman stain. The photomicrographs 2, 3 and 4 were obtained after oblique deposition of about 100 angstroms of silver deposited at an angle of about $\tan^{-1} \frac{1}{4}$. Unstained smears exposed to osmic acid vapour and fixed in methyl alcohol were shadowed with silver. These shadow micrographs show details of surface structure of the flagellate form of *Leishmania donovani*.

The body of the flagellate shows several well-defined elevations and depressions or clefts. There is a large oval-shaped bulge corresponding to the site of the nucleus; this measures about 3.2 microns in length and 1.7 microns in maximum width. There is a small elevation of approximate diameter 0.77 micron about the centre of the nucleus corresponding to the nucleolus. The parabasal body is seen as a rod-shaped elevation just anterior to the nucleus,