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which fluoresced strongly under ultraviolet light and which consisted of substances, probably phenols, which had about the same R_F value as diethylnitrosamine. The whole plate acquired a background colour due to traces of nitrite in the atmosphere, but the diethylnitrosamine spot came up quickly, was distinct from the background and faded fairlyrapidly on keeping. After a while, a faint spot arose on the site of the fluorescent substances; this was easily distinguished from a nitrosamine spot by the fact that it took a long time to appear, was barely distinct from the background and was permanent. It was considered that it might be due to some reaction involving phenolic substances present in flour and traces of nitrite from the atmosphere, since similar spots were produced by *p*-nitrosophenol, 1-nitroso-2-naphthol, caffeic acid and synthetic 1-caffeyl glycerol (Thewlis, *J. Fd Technol.* 1967, **2**, 83). It would therefore seem advisable to purify extracts carefully before subjecting them to chromatography, and the more recent authors recommend that the nitrosamine should be isolated by steam distillation and then repeatedly washed with caustic soda solution. In this way, misleading effects due to phenols can be eliminated.

We hope to report, at a later date, on the use of a polarographic method of testing for the presence of nitrosamines in flour.

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Fd Cosmet. Toxicol. Vol. 6, pp. 823–824. Pergamon Press 1968. Printed in Great Britain

CARCINOGENICITY OF A RUBBER ADDITIVE

Sir,—In view of your recent comments (*Food and Cosmetics Toxicology* 1968, **6**, 670) on a carcinogenicity study of certain rubber additives carried out at this Institute, you may be interested in the results of a further study of one of the compounds concerned.

In the paper reviewed, Boyland *et al.* (*Eur. J. Cancer* 1968, **4**, 233) reported the occurrence of sarcomas in Wistar rats given repeated intraperitoneal injections of polymerized *N*-nitroso-2,2,4-trimethyl-1,2-dihydroquinoline ('Curetard'; NTDQ) suspended in polyethylene glycol. The significance of this finding was in some doubt because relatively little is known of the ways in which the peritoneal cavity of the rat may respond to foreign agents of this kind. A further investigation was therefore undertaken, in which NTDQ was administered to rats by the subcutaneous, intraperitoneal or oral route.

Sprague-Dawley rats, 6–7 wk old, were divided into five groups each consisting of 20 males and 20 females. Two groups were injected subcutaneously (Group 1) or intraperitoneally (Group 2) with 25 mg NTDQ in 0·25 ml polyethylene glycol, once weekly for 20 wk, to provide a total dose of 500 mg NTDQ/rat in each case. The rats in Group 3 were force-fed thrice weekly for 20 wk with 25 mg NTDQ in 0·25 ml polyethylene glycol to give a total dose of 1500 mg NTDQ, while Group 4 received subcutaneous injections of

0·25 ml polyethylene glycol once weekly for 20 wk and Group 5 received no treatment. The animals were Caesarean-section derived and were maintained under barrier conditions throughout the experiment, which was terminated at 106 wk. Over 80% of each sex survived for 80 wk, after which several females had to be killed because they developed mammary tumours.

In the subcutaneous tissues of the males of Group 1, four tumours were evident before death, two were detected at necropsy and there were 14 early neoplastic lesions detectable only by microscopy. Corresponding figures for the females of this group were one, two and six. In Group 2, no intraperitoneal tumours were evident macroscopically in either sex, but microscopic neoplasms were found in two males and in one female. No such tumours occurred in Groups 3, 4 and 5. No gastro-intestinal neoplasms developed in rats force-fed with NTDQ (Group 3) and there were no tumours of the liver or kidney in this group of animals. The incidence and range of tumours at distant sites was similar in test and control rats and it is noteworthy that no neoplasms of the bladder were encountered.

These findings show that intraperitoneal injections of NTDQ are carcinogenic in Sprague-Dawley as well as in Wistar rats. They also indicate that the subcutaneous tissues are a good deal more sensitive than the peritoneal cavity to the tumour-inducing effects of this material. By contrast, force-feeding of large amounts of NTDQ did not increase the incidence of tumours at any site. While these results do not clear NTDQ completely from suspicion as a possible cancer hazard for man, its apparent lack of activity when administered orally suggests that the risk from occupational exposure to this material is not likely to be serious. The pathological findings in this experiment are of considerable general interest, particularly in relation to the early development of injection-site sarcomas, and will be fully discussed elsewhere (Carter, *Br. J. Cancer*, 1969, in press).

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