region of the stomach showed significantly higher T/M value for uptake of iodine-131 when compared with slices from the pyloric region. The difference between the T/M values for uptake of iodine-131 by slices from fœtal and maternal placentæ was not significant. Slices of liver showed very low uptake of iodine-131 and the T/M values for the fresh and boiled tissues were practically the same. Addition of thiouracil (0·02 mgm./ml.) to the medium resulted in a decrease in uptake of iodine-131 by salivary glands and stomach slices, but it had no effect on uptake of iodine-131 by placenta or liver. Potassium thiocyanate and sodium cyanide also caused a decrease in uptake of iodine-131 by salivary glands and stomach, but not in the case of placenta or liver. Addition of thyroid-stimulating hormone (50–200 mgm./ml.) to the medium containing tissue slices did not show any effect on uptake of iodine-131 by these tissues.

Addition of large doses of penicillin (1,000 I.U./ml.) to the medium resulted in a decrease in T/M values for uptake of iodine-131 by salivary glands and stomach slices. The results for T/M values for uptake of iodine-131 by salivary glands and stomach of mouse, dog and cow were similar to that for rat except the difference between parotid and submaxillary glands was not so marked as in the case of rat. Uptake of iodine-131 by placenta of mouse was similar to that of rat. In general, the results indicate that iodide concentration mechanism in the salivary glands and stomach, but not in liver or placenta, appears to be similar to that of thyroid gland.

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[1] Maqsood, M., and Reineke, E. P., *Fed. Proc.*, **19**, 172 (1960).

Tumours of the Small Intestine in Rats after Intestinal X-Irradiation

Certain effects of X-irradiation of the exteriorized or *in situ* intestine of Sprague–Dawley rats were previously reported from these Laboratories[1]. In view of the scarcity of information concerning the occurrence of tumours after exposure of the intestine to irradiation, survivors of that study, and their controls were kept for further observation. This communication reports the incidence of intestinal tumours among 51 rats that were irradiated at an age of 5 months and were killed between 9 and 30 months later. All but seven experimental and two control animals were killed because of the presence of tumours or other diseases. The nine rats were arbitrarily killed at an age of ten months at the conclusion of the period of experimentation.

In the exposures of the exteriorized intestine, the entire intestine except a portion of the duodenum and the rectum was delivered through an incision in the abdominal wall for irradiation while the remainder of the body was protected by a lead shield. The partial-body exposures were carried out through a window in a lead shield designed so that only the abdominal region was exposed. The $LD50$ was about 1,550 r. and the $LD90$ about 1,900 r. for both modes of exposure.

The incidence of intestinal tumours in irradiated and control groups is presented in Table 1. There the animals are grouped by exposure into doses below the $LD50$ and those at or above the $LD50$. The number of survivors at high levels was necessarily small. All intestinal tumours occurred in the small intestine, the region of principal histological damage. The earliest tumour was observed at 9·5 months.

Table 1. Incidence of Intestinal Tumours

Method of exposure	Dose range (r.)	Incidence	Type of tumour
Exteriorized	900–1,300	0 of 10	
,,	1,500–1,900	5 of 18	3 mucinous carcinomas 1 leiomyosarcoma 1 lymphosarcoma
Partial body	700–1,300	0 of 11	
	1,500–1,900	2 of 12	1 mucinous carcinoma 1 leiomyosarcoma
Control		0 of 25	

The incidence of malignant intestinal tumours is lower and the tumour development later than that reported by Osborne[2]. However, the radiation exposures cited here were predominantly in the mid-lethal range in contrast to the uniformly lethal dose-range employed by Osborne, who obtained survival by clamping the superior mesenteric artery and vein during exposure. Tumour development in this experiment was confined to the mid-lethal and higher dose-range, for which substantial acute intestinal damage was previously demonstrated histologically[1]. The results presented here are compatible with a dose-dependent carcinogenic effect of X-irradiation on the small intestine of the rat.

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[1] Sullivan, M. F., Marks, S., Hackett, P. L., and Thompson, R. C., *Rad. Res.*, **11**, 653 (1959).
[2] Osborne, J. W., Nicholson, D. P., and Solem, R., *Rad. Res.*, **12**, 460 (1960).

BIOLOGY

Fine Structure of the Neurosecretory System in Lepidoptera

The following is a short account of an electron microscope study of neurosecretory cells found in three lepidopterous insects, *Bombyx mori*, *Philosamia cynthia ricini* and *Papilio xuthus*. I believe I may have succeeded in observing early stages in the formation of secretory granules in the perikarya of neurosecretory cells of the intercerebralis.

The brain-cardiaca-allata complexes were taken from mature larvæ and fixed in 1 per cent osmium tetroxide adjusted with phosphate buffer to *p*H 7·0–7·4. The tissue was then embedded in methyl methacrylate and *n*-butyl methacrylate in the proportions 1 : 3.

Mitochondria, Golgi apparatus and the endoplasmic reticulum are commonly present as in neurones in general. The most striking feature frequently encountered is the appearance of fine, elliptical, electron-dense granules (Fig. 1, *g*). These