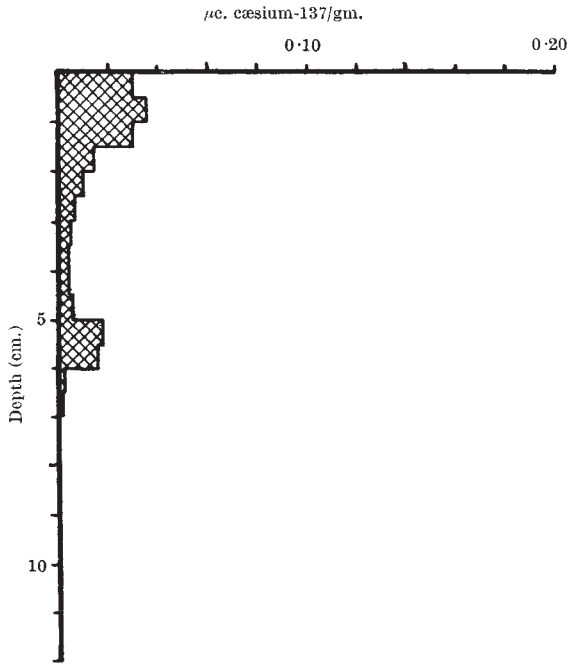

Fig. 2. The distribution of radiocæsium in clay after 1,000 mm. precipitation. The layer from 0–5 cm. depth is crumbled clay, from 5–12 cm. depth the clay is compact

When 1-gm. samples of a clay and a sand containing 0·1 μc. cæsium-137 per gm. soil were shaken for 4 hr. with 2·5 ml. acetate buffer (*p*H 4·8) only 2 and 5 per cent respectively of the cæsium-137 went in solution. This result might point to a small assimilation by the roots of plants. Indoor experiments on grass, growing on clay or sand containing 10 μc. cæsium-137/kgm., showed (in agreement with the results of Romney *et al.*[7] and Nishita *et al.*[8]) that only a few tenths of 1 per cent were actually assimilated in a period of several months. Probably only the exchangeable fraction of the cæsium-137 present in the near vicinity of the roots was assimilated.

The assumption that the main route of contamination of the biosphere is by foliar absorption was re-examined in experiments with cut grass. Thoroughly washed grass was held for 15 min. in solutions with cæsium-137 in different concentrations. The results of measurements of the amount of absorbed cæsium-137 indicate that from extremely

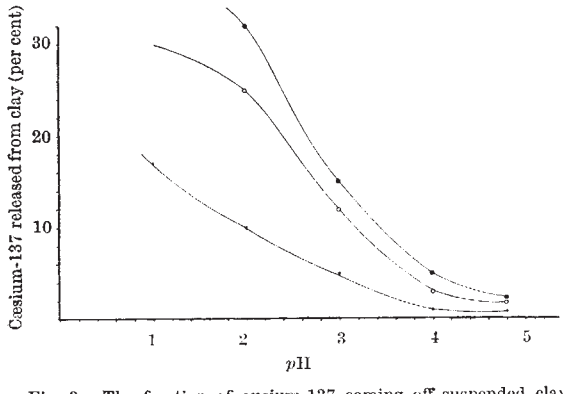

Fig. 3. The fraction of cæsium-137 coming off suspended clay after shaking for different lengths of time with solutions of varying *p*H. +, After 5 min.; o, after 30 min.; ●, after 240 min.

diluted solutions of cæsium-137 in water about 30 per cent is fixed by the leaves in 15 min. Since even washed grass still contains about 0·1 per cent (weight) of adhering soil particles a considerable part of the absorbed cæsium-137 might actually be bound to these particles. Natural grass contains 0·2 - 2 per cent silica originating from adhering soil[9].

Cows may ingest together with grass several hundred grams of top soil a day (private communication by staff members of the University Veterinary X-ray Department). In Fig. 3 it is shown that with decreasing *p*H increasing amounts of cæsium-137 go in solution. In the omasum of the cow a *p*H of 2–3 prevails, and this is sufficient to dissolve in ½ hr. about 20 per cent of the cæsium-137. Under suitable conditions, for example, prolonged drought or low cæsium-137 activity of rain-water, soil could become of importance as a source of cæsium-137 to the cow and possibly also to pigs and goats. It might be worth while to re-investigate available data for an evaluation of the relative importance of soil in the transport of cæsium-137.

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In vitro Uptake of Iodine-131 by Salivary Glands, Stomach and Placenta

The ability of the thyroid gland to accumulate iodide against a concentration gradient and to maintain a high gland/plasma concentration is well known. Recently it has been shown that *in vitro* uptake of iodine-131 by the lactating mammary tissue of the rat was 10–15 times that of liver, muscle or boiled mammary tissue, and uptake of iodine-131 was increased to about twice the level observed in fresh mammary tissue by storage for 24 hr. in Ringer-phosphate at 7° C. and continued high for 25 days storage[1]. In the present experiments, *in vitro* uptake of iodine-131 by salivary glands, that is, submaxillary, parotid and sublingual; different regions of stomach, that is, fundic and pyloric; placentæ, that is, fœtal and maternal; duodenum and liver of rat were studied by incubating the tissue at 37° C. for 6 hr. in nutrient medium with *p*H 7·2 and the effects of thiouracil, potassium thiocyanate, sodium cyanide, iodide and thyroid-stimulating hormone on uptake of iodine-131 by these tissues were also investigated.

The *T*/*M* value (counts per minute per 100 mgm. tissue divided by counts per min. per 0·1 ml. medium) for uptake of iodine-131 by parotid gland was significantly higher when compared with that of submaxillary or sublingual glands. Slices from the fundic

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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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

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	

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.

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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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