In glycerol treated rats, the survival of the irradiated sham operated rats was nearly linear with time (Figure 2). 50% mortality was reached approximately 32 h post-irradiation, and all rats died within 75 h. The 50% mortality time of the LCB group was approximately 57 h after exposure, but all rats in this group were dead 79 h after exposure. Extravasation of fluorescein was macroscopically visible in the brain slices taken in all 4 groups involved in this study at the time of irradiation, and in the LCB and sham operated irradiated groups 48 h following exposure. No deaths occurred in the nonirradiated glycerol treated LCB or sham operated rats.

Rats in the third study showed very pronounced BBB alterations 24 h after receiving $HgCl_2$ injections as indicated by the extravasation of fluorescein dye. The 50% mortality time of the irradiated LCB and sham operated rats did not differ significantly from each other (Figure 3). Again, fluorescein extravasation was visible in the brain slices taken from all groups 48 h after irradiation especially in the $HgCl_2$ treated LCB animals. No deaths occurred in the nonirradiated $HgCl_2$ treated LCB or sham operated rats.

Discussion. Among the reported findings that result from a supralethal dose of irradiation are neurotransmission disorders[7,8], cerebral capillary injury[1,9,10], and BBB alterations[1,2,9,10]. Even though BBB alterations are seen following central nervous system radiation injury, it is not clear whether these alterations per se appreciably affect survival time.

In this study, a dose of 20,000 rads of whole-body γ-neutron radiation was selected which resulted in 50% mortality within 48 h. 3 different techniques to alter the BBB prior to irradiation, which produced a wide range of damage to the BBB, were used: lymphatic cervical blockade[4], glycerol injection[6] and $HgCl_2$ injection[11]. Extravasation of injected fluorescein into the brain parenchyma confirmed that these 3 methods caused BBB alterations without causing the death of the animal.

The BBB alterations thus induced by LCB and glycerol or $HgCl_2$ injection, when followed by irradiation, did not significantly shorten survival when compared to animals receiving irradiation alone. This suggests that BBB alteration prior to irradiation does not contribute significantly to mortality, further suggesting that BBB damage may bear no direct relationship to survival after acute radiation injury.

Résumé. Les altérations de la barrière sang-cerveau avant l'irradiation n'a pas influencé le temps éventuel de survivance des rats exposés aux doses supermortelles de radiation. Ce résultat suggère la possibilité qu'il n'existe pas de rapport direct entre le dommage de la barrière sang-cerveau et le temps de survivance après irradiation.

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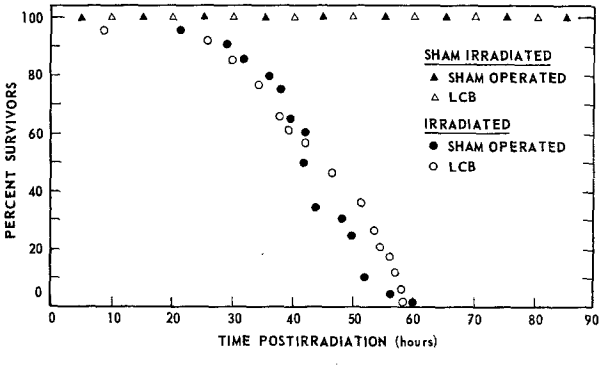

Fig. 3. Survival time of mercuric chloride pretreated rats with and without lymphatic cervical blockade (LCB) after exposure to 20,000 rads of whole-body mixed γ-neutron radiation.

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A Renal Tumour of the Nephroblastoma Type in *Praomys (Mastomys) natalensis*

The *Mastomys* or *Praomys natalensis* is described by OETTLE[1] as an intermediate rodent between the rat and the mouse. Different tumours develop spontaneously in this animal. The most known is a malignant argyrophilic carcinoïd of the stomach (SNELL et al.[2]).

Material and methods. 10 couples of *Mastomys*, aged $1^1/_2$ months and weighing from 40–50 g, were supplied by the Medical Research Council, National Institute for Medical Research of London in May 1971. They were reproduced in our laboratory. We weighed them systematically every 2 weeks and when one *Mastomys* showed abnormal signs as loss of weight, decrease in motility, palpation of an abnormal mass, it was sacrified.

Our study is directed towards *Mastomys* aged from 17–24 months and weighing from 50–80 g. 10 *Mastomys* died without us being able to take specimens from the organs; all were females. For histological study, paraffin sections were cut at 7 µm and stained with Hemalun-Erythrosine-Safran. Our histoenzymatic study regarding the cholinesterase activities in the different organs of the *Mastomys* followed our usual scheme (DELBARRE et al.[3]).

Results. Macroscopic examination (Table). 14 *Mastomys* were sacrified. One had a vegetating and infiltrating cutaneous tumour of 20 mm × 20 mm in diameter which showed the histological picture of differentiated squamous cell carcinoma of the epidermis.

5 Mastomys had renal tumours, unilateral in 3 cases and bilateral in 2. In *one Mastomys* with a unilateral renal

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[2] C. K. SNELL and H. L. STEWART, Science *163*, 470 (1969).
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Summary of results of study of 19 *Mastomys* with abnormal signs

	Age in months	Abnormal signs	Macroscopic examination	Microscopic examination
1. F♂	19	Loss of weight, skin ulcer	Cutaneous ulcer, splenomegaly, hypertrophy of thymus	Squamous cell carcinoma
2. F♀	$21^1/_2$	Loss of weight	Splenomegaly	N.a.[a]
3. F♂	$21^1/_2$	Loss of weight	N.a.	N.a.
4. F♂	$21^1/_2$	Sick (weak)	N.a.	N.a.
5. F_1♀	13	Loss of weight	N.a.	N.a.
6. F_1♂	17	Loss of weight	N.a.	N.a.
7. F_1♂	17	Loss of weight	N.a.	N.a.
8. F_1♂	$17^1/_2$	Loss of weight	N.a.	N.a.
9. F♂	23	Loss of weight, loss of motility, palpation of a mass in right hypochondrium	Tumour of right kidney	Right nephroblastoma
10. F_1♂	19	Loss of weight, loss of motility	Tumour of right and left kidney	Right + left nephroblastoma
11. F♂	24	Loss of weight, loss of motility, palpation of a mass in right hypochondrium	Tumour of right and left kidney	Right + left nephroblastoma
12. F_1♀	19	Loss of weight, loss of motility	Tumour of left kidney, hypertrophy of thymus	Left nephroblastoma, Thymoma
13. F♀	24	Loss of weight, loss of motility	Tumour of left kidney	Left nephroblastoma
14. F_1♂	19	Loss of weight	N.a.	N.a.

[a] N.a., nothing abnormal.

tumour, we discovered as well a thymoma of 4 mm in diameter, with histologically a predominance of thymocytes. The renal tumours appeared as rounded whitish, quite firm masses, which were adherent to the perirenal fatty tissues. They appeared to arise from the peripherical part of the renal cortex (Figure 1).

Microscopic examination (Table). The renal tumours were composed of proliferation of cells having dense nuclei and less abundant cytoplasm, which were grouped in undifferentiated lobules or more or less cavitated tubular structures. Proglomeruli, sometimes numerous, were also visible. Mitoses were rare. In between the lobules of the epithelial structures, we observed partitions composed of immature mesenchymal tissue or connective tissue rich in collagen (Figure 2).

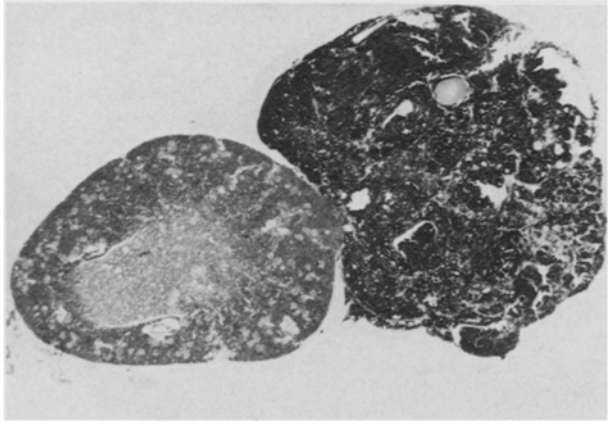

Fig. 1. Lobular tumour mass developed from the peripherical part of the renal cortex. Hemalun-erythrosine-safran. ×12.

Histoenzymatic study. As we had described elsewhere (Delbarre et al.[5]), acetylcholinesterase activity did not exist in the kidneys of *Mastomys*, while the activity of pseudocholinesterase was localized in the smooth muscle of the media of the interlobular and arcuate arteries and in the terminal part of the nephron : i.e. loop of Henle and distal convoluted tubules.

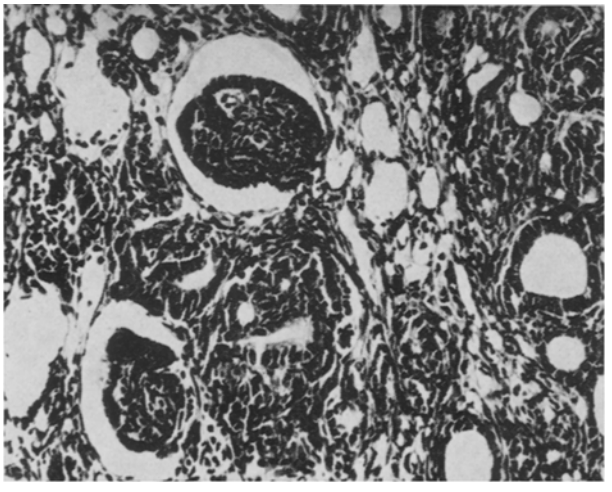

Fig. 2. Tubular differentiation and proglomeruli in the lobules of the tumour. Hemalun-erythrosine-safran. ×125.

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In the nephroblastoma of *Mastomys*, there was no activity of acetylcholinesterase. However, a diffuse pseudocholinesterase activity of moderate intensity was evident in most lobules of the tumour, and was more dense around the differentiating tubules (Figure 3).

Discussion. In the 14 sacrified *Mastomys*, one male animal, aged 19 months, showed squamous cell carcinoma of the skin, while 5 others, 3 males and 2 females, aged from 19–24 months showed nephrablastoma, in which one was associated with a thymoma. To our great disappointement, we did not observe any malignant argyrophil carcinoid tumour of the stomach in our colony of *Mastomys*.

STEWARD and SNELL[6] had observed 27 thymomas and 11 cases of hyperplasia of the thymus in one series of 113 *Mastomys*. 22 animals with thymomas also had tumours of one or more extra thymic sites. Extra thymic neoplasms were judged to be no more frequent than in their entire colony. SNELL and STEWART[7] observed 5 renal tumours in one series of 188 *Mastomys* (2 papillary clear-cell adenocarcinoma, 1 papillary serous cystadenocarcinoma, 1 cystadenoma and 1 hemangioma) but without nephroblastoma. WILLIS[8] reported that tumours undoubtedly comparable to the human nephroblastoma occur in the pig, sheep, rabbit and hare, rat and fowl. Most of the affected animals are young.

The high proportion of renal tumours of the nephroblastoma type in the relatively old animals of our *Mastomys* colony appears remarkable. This might be dependant on genetic or infective factours in this particular colony. The evidence of the relatively intense pseudocholinesterase activity in the walls of tubular structures of nephroblastoma may indicate that this enzymatic activity appears at quite a precocious stage of the renal organogenesis.

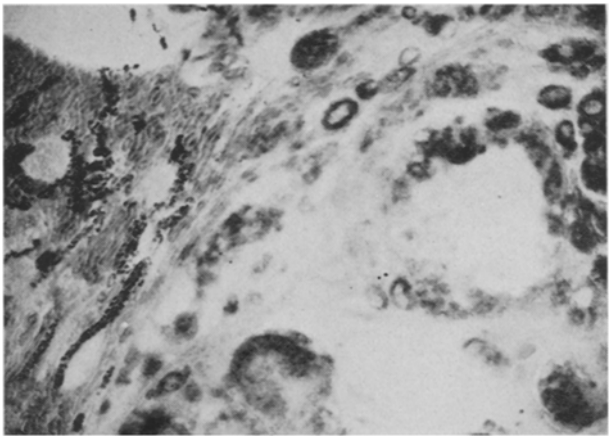

Fig. 3. Evidence of speudocholinesterase (KOELLE-FRIEDENWALD[4]). To the left, the renal parenchyme shows black localization in the loop of Henle and distal convoluted tubules. To the right, the tumour shows the pseudocholinesterase activity which is more diffuse and less intense. It is more marked in the periphery of the differentiating tubules.

Résumé. 5 néphroblastomes ont été observés dans une série de 14 *Praomys* (*Mastomys*) *natalensis*. Une activité pseudocholinestérasique diffuse a été mise en évidence dans ces tumeurs, tandis que dans le parenchyme rénal normal, cette activité est localisée dans la partie terminale des néphrons.

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Sterilization by Irradiation of *Cadra cautella* (Wlk.) (Lepidoptera, Pyralidae) Males Increased by Female Sex Pheromone

The high doses of γ-irradiation needed to induce sterility in Lepidoptera[1] result in somatic damage, which in the context of the 'Sterile insect release technique' interfers with competitiveness[2].

Knowing that the partial pressure of oxygen in the tissue is one of the most important factors in radiation sensitivity[3–6], and subsequent recovery[7–9], we speculated that any preferential increase of oxygen tension in the genital tissues, such as may occur in males exposed to female sex pheromone, will interact with irradiation to bring about sterility at lower doses, thus avoiding somatic damage.

To investigate this we exposed 0–24 h old males of *Cadra cautella* [= *Ephestia cautella*] to 40 krad of γ-radiation from a 60 Co source (Gammacel 200 Atomic Energy of Canada Ltd.) at a dose rate of 2250–2200 rad/min. in the presence of female sex pheromone.

This radiation dose fails to induce the desired degree of sterility in the absence of pheromone, although in a previous work, when the dose rate was 5000–4300 rad/min., the same dose was established as the sterilizing dose for *C. cautella* males [10,11].

Female sex pheromone, extracted from virgin females[12], was applied on filter paper at doses of 0.1, 0.5 and 1.0 female equivalent (FE) which was introduced into plastic containers of 7.2 cm^3 containing 15–18 males 3 min. prior to irradiation.

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