

sterone were predominant metabolites of T. This indicates the reduction of the 4-5 double bond and the subsequent reduction of the carbonyl group at C-3. The highest percentage of Δ^4 -androstene-3,17-dione and androsterone was observed in the thymus of 3-week-old rats and the lowest was in that of 10-week-old ones. These findings represent that the activities of Δ^4 -5 α -hydrogenase and 3 α -hydroxysteroid dehydrogenase were slightly elevated at 3 weeks of age. The significance of these findings are not known, but it is of interest that a high metabolic rate was observed in a 3-week-old rat which was at the time of prepuberty.

Zusammenfassung. Stoffwechseluntersuchungen von $4\text{-}^{14}\text{C}$ -Testosteron wurden in vitro mit Thymushomogenaten, die aus 2, 3, 4, 5, 7 und 10 Wochen alten männlichen Ratten gewonnen wurden, durchgeführt. Die Radiochromatogramme der Metaboliten zeigten ein gleichartiges Bild.

N. SATO, M. OTA and K. OBARA

*Iwata Medical University,
School of Medicine, Department of Biochemistry,
Morioka, Iwate (Japan), 8 July 1969.*

Morphological Counterparts of the Genetically Determined Resistance of Mice to Chloroform Poisoning

Chloroform causes renal tubular necrosis in male mice of the strain C3H/He, resulting in the death of animals within 4-9 days¹. Necrotic tubules calcify, no signs of tubular regeneration being present. Females of this strain, as well as males and females of the strain C57BL/6JN and BN, survive the chloroform intoxication. The same is true of the males of the generation F1 from the crossing ♀♀ C3H/He × ♂♂ C57BL/6JN². Accidental chloroform poisoning in mice was reported by CHRISTENSEN et al.³ and JACOBSEN et al.⁴.

The purpose of the present experiment was to check the development of renal lesions after chloroform poisoning in males and females of the resistant strains C57BL/6JN, BN, as well as of the generation F1 deriving from the crossing of mice of strain C3H/He and C57BL/6JN.

Material and method. The material consisted of the following groups of sexually mature mice, aged 2-3 months, weighing 18-20 g:

Group I. 16 male and 16 female mice of the strain C57BL/6JN.

Group II. 16 male and 16 female mice of the strain BN.

Group III. 16 male and 16 female mice of the generation F1/♀♀ C3H/He × ♂♂ C57BL/6JN.

Each of the mice received s.c. a single dose of 0.1 cm³ of 0.05 g of chloroform in 1 cm³ of ethyl laurate.

The animals were destroyed after 6, 12, 24, 48 h, 4, 6, 8, 10 days. After post-mortem examination the kidneys were fixed in 10% formalin. Paraffin sections were stained with hematoxylin and eosin, with PAS, with azan after Heidenhain, and with van Kossa method for calcium.

Results. All animals survived the intoxication, none of them died spontaneously. The kidneys of female mice were normal throughout the course of the entire experiment.

All male mice exhibited morphological signs of renal damage between the 6th and 12th h after chloroform injection (Figure 1). The lesions consisted of the acidophilic necrosis of some segments of proximal convoluted tubules, situated particularly in the outer cortex. Tubular basement membrane was unchanged. Up to the 4th day the lesions gradually became more extensive and were associated with the presence of protein-containing fluid, initially in the lumen of proximal convolutions, later of Henle's loop and collecting tubules.

On about the 4th day, all animals developed tubular regeneration which continued throughout the course of experiment. Necrotic epithelium did not show any calcification, and was undermined by young, flat, basophilic epithelial cells encroaching upon the basement membrane

(Figure 2). Between the 4th and 10th day of regeneration basophilic epithelium formed renal tubules, and gradually differentiated into acidophilic form typical of proximal convolutions. As was stated in previous report², the kidneys are almost normal, showing only focal regeneration on the 15th day (Figure 3).

Discussion. The present experiment provides a morphological basis of the mechanism of the genetically determined resistance against chloroform poisoning of male mice of the strains C57BL/6JN, BN, and of generation F1 derived from the crossing of a susceptible strain C3H/He and a resistant one C57BL/6JN.

Initially all male mice showed renal tubular necrosis. They were thus susceptible to the harmful action of chloroform. The fact of survival of these mice seems to depend upon two essential 'defensive' phenomena which

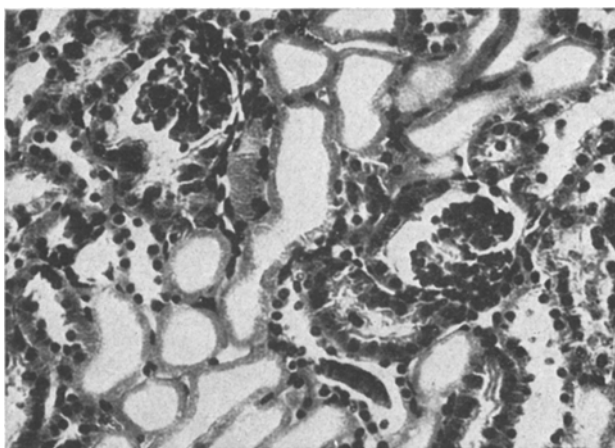


Fig. 1. Male mouse, generation F1 (C3H/He × C57BL/6JN), 24 h after chloroform poisoning. Necrosis of renal tubular epithelium. H.E., magnitude about × 400.

¹ Z. ZALESKA-RUTCZYŃSKA and S. KRUS, *Patol. pol.*, submitted for publication (in Polish).

² Z. ZALESKA-RUTCZYŃSKA and S. KRUS, *Patol. pol.*, submitted for publication (in Polish).

³ L. B. CHRISTENSEN, G. L. WOLFF, B. MATANIC, E. BOND and E. WRIGHT, *Z. Versuchstierk.* 2, 135 (1963).

⁴ L. JACOBSEN, E. KRAG ANDERSEN and J. V. THORBERG, *Acta path. microbiol. scand.* 67, 503 (1964).

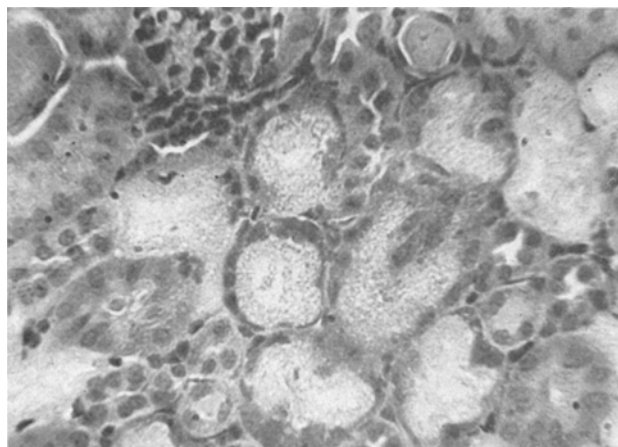


Fig. 2. Male mouse, generation F1 (C3H/He $\times$ C57BL/6JN), 6 days after chloroform poisoning. Regenerating renal tubular epithelium undermines and gradually replaces the necrotic cells. H.E., magnitude about $\times 400$.

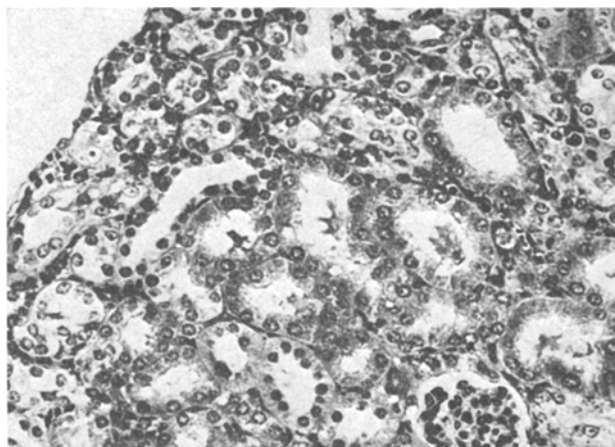


Fig. 3. Male mouse, generation F1 (C3H/He $\times$ C57BL/6JN), 15 days after chloroform poisoning. Focal tubular regeneration within otherwise normal kidney. H.E., magnitude about $\times 400$.

are absent from the males of the strain C3H/He: (1) the necrotic renal tubules did not calcify; the calcification might have been the reason why the C3H/He mice died before any regeneration was possible; (2) the kidneys exhibited an enormous capacity for regeneration which resulted in almost full restitution of renal integrity up to the 15th day of experiment.

This finding seems to be of genetical, morphological and practical importance. Not least of its consequences is the conclusion that the chloroform-poisoned male mice of the strains in question can serve as a useful experimental model for studying renal tubular regeneration. Our experiments are being continued.

Résumé. L'intoxication au chloroforme des souris mâles C57BL/6JN, BN et de la génération F1 des souches C3H/He et C57BL/6JN entraîne une nécrose tubulaire rénale suivie par la régénération de l'épithélium tubulaire rénal. Tous les animaux survivent.

S. KRUS and Z. ZALESKA-RUTCZYŃSKA

Department of Pathological Anatomy,
Postgraduate Medical Education Center,
Warszawa-Bielany (Poland), and
Department of Histology and Embryology,
Medical Academy in Warsaw (Poland), 16 July 1969.

Nouvelles données sur la cytogénétique et la spéciation des *Leggada* (Mammalia - Rodentia - Muridae)

Depuis la parution d'une révision¹ portant sur 213 *Mus* africains pour lesquels il est pratique de conserver la dénomination de *Leggada*, 49 nouveaux exemplaires ont été examinés, l'étude taxonomique ayant été faite par le Dr. F. PETTER (Muséum national d'Histoire naturelle, Paris), l'analyse des caryotypes par moi-même.

De ces 49 spécimens, 24 ont déjà fait l'objet de publications: 18 *musculoides* de Côte d'Ivoire appartiennent au système polymorphe ($2N = 34/33/32/31$) précédemment décrit, 4 ♀♀ sur 14 présentant à l'état hétérozygote une délétion partielle de l'un des bras d'un X^2 . De la région de Niamey, 6 exemplaires du groupe *Tenellus* diffèrent cytologiquement beaucoup³ des Souris du même groupe provenant d'Accra⁴. Le Dr. F. PETTER estime que nous avons affaire à 2 espèces distinctes, la forme de Niamey correspondant à *M. haussa* Th. et Hinton, celle d'Accra constituant une nouveauté spécifique, *M. mattheyi* Petter⁵.

Restent à présenter 25 exemplaires: l'un d'entre eux, provenant de Stellenbosch, Province du Cap, est un *minutoides* typique ($2N = 18$, $N.F.$ (nombre de bras principaux) = 36, chromosomes sexuels TR). Un second, originaire de Kumba, Camérout, est un *setulosus* ($2N = 36$, $N.F. = 36$, chromosomes sexuels PR). Un troisième, capturé à Bobo-Dioulasso, Haute-Volta, a été déterminé comme *mattheyi*.

De Nigéria, 12 souris d'une série cytologiquement polymorphe ($2N = 34/33/32$, $N.F. = 36$, chromosomes sexuels TR) ne diffèrent en rien des *musculoides* de Côte d'Ivoire et de République centrafricaine. Par contre, 6 sujets, originaires du Kafue National Park de Zambie, très semblables morphologiquement, sinon identiques aux précédents, appartiennent à une forme peut-être monomorphe puisqu'ils possèdent 34 chromosomes. Deux autres *Leggada* de même provenance ont été étudiées par Miss HALLETT (in litteris) et ont également 34 chromosomes. L'échantillon est cependant trop petit pour que l'absence de polymorphisme soit assurée.

Les 4 derniers spécimens ont été récoltés à Ippy en République centrafricaine et présentent un intérêt très vif dont la compréhension exige quelques considérations préalables d'ordre géographique: un peu en dessous du 5° de latitude nord, Bangui à l'Ouest et Bangassou à l'Est sont distants de 500 km. Ippy, au Nord de ces deux localités, est à 350 km de Bangui, de 250 de Bangassou.

¹ R. MATTHEY, Rev. suisse Zool. 73, 585 (1966).

² R. MATTHEY, Arch. Julius Klaus-Stift. 42, 21 (1967).

³ R. MATTHEY, Genetica 38, 211 (1967).

⁴ R. MATTHEY, Experientia 22, 400 (1966).

⁵ F. PETTER, Mammalia 33, 118 (1969).