the mitochondria appear in distilled water preparations[1], burst, probably as a result of the freezing and drying. On the pictures the three main components i.e. membranes, inner bodies and matrix substance, are easily recognized, but their mutual relationships are hard to ascertain, as they form fragments scattered over the fields of view. After xylene treatment, however, the inner bodies were found to be composed of smaller granules, just as after drying at 0°C. The dimensions of these granules were also found to be the same as in the directly dried ones, i.e. 300 Å.

On the contrary, in those mitochondria which had been frozen-dried from 0·88 *M* sucrose solution, the mitochondrial membranes were obviously broken up, but with localization of the inner parts of the mitochondria largely retained (Fig. 3). There were no signs of swelling of the membranes, as their remnants fit quite well the dimensions of the mitochondria present. The inner structure is revealed partly as a homogeneous mass, sometimes showing a cross-striation, and partly as composed of granules approx. 0·1 μ in diameter. After treatment with xylene, the granules were visualized as composed of smaller granules of approx. 300 Å diameter (Fig. 4). In places where the original morphology of the inner parts of the mitochondrion probably was retained, these granules were seen to give rise to a cross-striation of the mitochondria. The preparation method here employed is too crude as yet to allow a detailed study of the mutual relations of the granules.

It is surprising that the mitochondrial membranes, which in this type of preparation are seemingly not distended, and where the parts shown to the observer seem to be rather intact, do not show any lamellar structures protruding into the mitochondria. This is not in agreement with the observations[2] in thin sections of embedded material, where a cross-striation of the inner parts of the mitochondrial body is attributed to intramitochondrial membranes, entirely[3] or partly[4] going across the mitochondria. Any membranes in this sense were not found in sectioning isolated mitochondria[5]. On the other hand, a cross-striation of the mitochondrial body has repeatedly been observed in isolated material, as well as after fixation of mitochondria with OsO_4 in 0·88 *M* sucrose solutions[6]. The absence of intra-mitochondrial membranous structures in the present material could not be attributed to any damage due to the washings with water after fixation in alcoholic vapour, as shown in experiments performed in this laboratory[7]. The possibility remains that the cross-striation observed in sectioned material may not correspond to membranes within the mitochondria, but to the periodic arrangement of material with different electron-scattering power perpendicular to the long axis of the mitochondria. This hypothesis would find support in the observations on the arrangement of the granules forming the inner body in the present investigation, especially as the dimensions here found are in good agreement with those reported for the distances between the intra-mitochondrial cross-striations. The question is receiving further attention in this laboratory.

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Department of Histology, University of Lund, Sweden, July 16, 1954.

Zusammenfassung

Die Autoren stellen mit einer speziellen Technik Präparate von aus Rattenleber isolierten Mitochondrien her, die mit Xylol nachbehandelt werden. Dadurch wird der Innenkörper der Mitochondrien einer eingehenden elektronenmikroskopischen Untersuchung zugänglich. Der Innenkörper besteht aus einzelnen Granula, die einen Durchmesser von 300 Å haben. Die Anordnung der Granula ergibt eine charakteristische Querstreifung des Innenkörpers.

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Un cas nouveau de chromosomes sexuels multiples dans le genre *Gerbillus (Rodentia – Muridae – Gerbillinae)*

J'ai fait connaître[1] les conditions chromosomiques chez trois espèces de *Gerbillus: G. campestris* et *G. garamantis* ont respectivement 56 et 54 chromosomes, les mâles étant dotés d'un couple X–Y du type habituel pour la sous-famille; l'X est métacentrique, l'Y submétacentrique, les deux hétérochromosomes étant de grande taille. Chez *G. pyramidum*, le nombre diploïde est de 40. A la méiose, il y a formation facultative d'un quadrivalent sexuel, le couple X–Y pouvant s'associer à un bivalent autosomique. L'interprétation du cas est facile et se fonde sur l'hypothèse d'une petite translocation entre l'un des bras court d'un autosome et le chromosome X.

Ainsi, au total, quatre cas de chromosomes sexuels multiples ont été décrits chez des Mammifères. Voici le cinquième.

Gerbillus gerbillus OLIVIER (les sujets étudiés proviennent du sud de l'Algérie et m'ont été donnés par le Dr F. PETTER du Muséum de Paris) est doté de 43 chromosomes, probablement tous métacentriques, ce nombre ayant été établi par l'analyse des cinèses spermatogoniales du mâle (Fig. 1). L'un des éléments est immédiatement reconnaissable à sa taille atteignant 10 μ et à sa forme asymétrique, le centromère séparant deux bras dont l'un est six à sept fois plus long que l'autre. Cet X diffère beaucoup de celui de tous les autres *Gerbillinae* étudiés dont l'X est un métacentrique.

Le nombre impair 43 laisse supposer que la femelle a 44 chromosomes, ce qui signifierait une digamétie mâle de type X–O. Il n'en est rien: des «squashes» d'ovaire permettent d'obtenir des figures correctes de mitoses dans les cellules folliculaires: ces divisions (Fig. 2) montrent 2 X et, au total, 42 chromosomes. Ceci implique l'existence de chromosomes sexuels multiples et le schéma: ♂ : $X - Y_1 Y_2$ · ♀ : $X - X$.

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Une telle formule présuppose la formation méiotique d'un trivalent avec disjonction anaphasique en X et Y_1Y_2. Il doit donc exister des métaphases II de deux types, l'un avec 21 dyades dont l'X, l'autre sans X mais avec 22 éléments. Ces prévisions se réalisent exactement comme les Figures 3–6 le démontrent. A la métaphase I (Fig. 3), il y a 21 constituants, le trivalent sexuel étant formé de l'X et de deux petits chromosomes formant un bivalent rattaché à l'extrémité distale de l'X. Il est douteux que cette liaison soit chiasmatique, ce qui impliquerait l'existence d'un triple chiasma. Les profils (Fig. 4) montrent la disjonction en X et Y_1Y_2 et les secondes cinèses sont effectivement de deux types caractérisés par 21 et 22 chromosomes. Les figures à 21 (Fig. 6) permettent d'identifier facilement le grand X qui manquent aux divisions montrant 22 chromosomes.

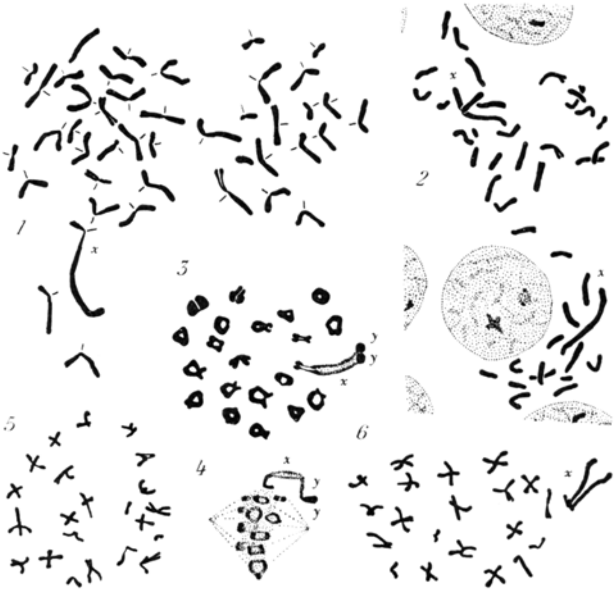

Fig. 1. Prométaphase spermatogoniale, 43 chromosomes.
Fig. 2. Prométaphase folliculaire, 42 chromosomes.
Fig. 3. Métaphase I vue en plaque équatoriale, 20 bivalents et le trivalent sexuel X-Y_1Y_2.
Fig. 4. Métaphase I vue de profil avec le trivalent sexuel.
Fig. 5. Métaphase II, 22 chromosomes.
Fig. 6. Métaphase II, 21 chromosomes dont l'X.
Les figures 1–3 et 5–6 d'après des préparations par écrasement. La Figure 4 d'après une coupe. Feulgen. × 1400.

Si la démonstration du type de digamétie est aisée, son interprétation cytogénétique est très difficile. Il conviendra de comprendre aussi les rapports qui peuvent exister entre les chromosomes sexuels multiples de *G. pyramidum* et ceux de *G. gerbillus*.

R. Matthey

Laboratoire de zoologie de l'Université de Lausanne, le 30 juin 1954.

Summary

4 species of the genus *Gerbillus* have been studied by the author; two belong to the usual scheme X–Y, X–X, two are provided with multiple sex-chromosomes. *Gerbillus gerbillus* ♂ shows at the first metaphase a sexual trivalent X–Y_1Y_2 and 20 autosomal bivalents. The diploïd number is 43. As expected, there is two types of metaphases II, with 21 and 22 elements respectively. The diploid number of the ♀ is 42 (two X).

Enhanced Susceptibility of a Highly Resistant Strain of Houseflies to Ingestion of Potassium Bromide

Various observations, that field resistant houseflies are more vigorous[1] have been recorded and, indeed, resistant strains from Sweden[2] and Egypt[3], have been found to be more resistant to adverse temperatures than susceptible strains. Others, on the contrary, hold the opinion, that the genes for insecticide resistance must somehow be detrimental[4] and that *high* resistance may be linked with cases of low viability, slower larval development[5] and decreased reproductive potential in the housefly and to some lesser extent in other resistant insects[6]. Finally, no significant difference could be shown between the resistant Bellflower strain, California, and a susceptible strain, as regards length of life cycle, average weight and susceptibility to heat and cold[7]. Babers, Pratt, and Williams[8] could find no difference attributable to resistance between 6 susceptible and 2 resistant strains of houseflies, as regards egg viability, length of larval life and number of adult flies obtained; they attribute the differences in larval period found by other authors to differences in environment[9] and to the large variation in the length of larval period, which is not peculiar to resistant strains[10]. They found, however, that the percentage of hatch of eggs of their most resistant strain (R–OB_{64}) was definitely lower than that of other strains[10].

In a recent study, Varzandeh, Bruce, and Decker[11] demonstrated with 3 susceptible and 4 resistant strains that "the inheritance of the factors associated with vigor such as egg production, pupal or adult weights, longevity of adults, egg hatchability and the survival of larvae and pupae, were independent of the factors associated with resistance". The only difference found by these authors is that, in general, resistant strains tended to have the longer pupal period.

In view of this controversy, it was deemed of interest to record here experiments in which the response of houseflies to the ingestion of salt solutions was investigated.

Experimental.–The majority of the experiments was carried out with a susceptible strain (T_1)[12] of *Musca domestica L.* and a highly resistant strain (K_1)[12]. The eggs

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