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GALLIUM DISTRIBUTION IN INSECT TESTIS AFTER AN INJECTION OF GaCl₃, AN EELS STUDY IN THE HOUSE CRICKET, ACHETA DOMESTICUS

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Résumé : Après une injection de GaCl₃, on trouve du gallium dans la chromatine et les chromosomes, dans le nucléole et dans les lysosomes.

Abstract : After an injection of GaCl₃, gallium is found in chromatin and chromosomes, in nucleoli and in lysosomes.

Since gallium shows an affinity for tumour tissue, the radionuclide ⁶⁷Ga is used as a diagnostic agent for the detection of cancers by scintiscanning techniques. It has been clearly shown that ⁶⁷Ga uptake by tumour cells is proportional to the mitotic index (1). This prompted our study on insect testis, together with the fact that we are currently studying the action of chemotherapeutic agents on this very same material.

In this EELS study, gallium was found in chromatin, chromosomes, nucleoli and lysosomes. Judging by the amount of stainability of the cellular organelles in material not treated with osmium, gallium seems to be also present — but in too small quantity to be detected — in mitochondria and in membranes, as with indium. Not only does the action of gallium resemble that of indium but the distribution of these two transition metals is similar. Iron is always present with them in our analyses. Perhaps they are bound to transferrin.

Chromatin in an elongated fairly mature spermatid. Insect injected with 10 µl of a 10⁻¹ M aqueous solution of GaCl₃. Treatment lasting 1 day.

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Nucleolus in a pachytene nucleus. Insect injected with 10 µl of a 10⁻¹ M aqueous solution of GaCl₃. Treatment lasting 1 hour.

The house crickets were injected intra-abdominally with 10 µl of one of four different aqueous solutions of GaCl₃, the concentrations of which were 10⁻² M (17.6 µg per insect), 2 x 10⁻² M, 4 x 10⁻² M and 10⁻¹ M. The treatment for each dose lasted 1 h, 2 h, 3 h, 4 h, 2 days, 3 days or 7 days and 1 month for 2 x 10⁻² M. The testes were rapidly dissected, fixed in 2.5 % buffered glutaraldehyde and postfixed in 2 % buffered OsO₄. The material was embedded in Epon and the sections were 200 nm thick. They were stained with uranyl acetate only.

The energy loss spectra, corresponding to selected areas 100 nm in diameter, were obtained at 1 MV using an O-filter and analysed with the Tracor system connected to the Toulouse 1.2 MV microscope. The L₂₃ peak of iron was found at 730 eV and that of gallium at 1140 eV.

This study would not have been possible without the help of Madame Kihn with the Tracor. We thank her most warmly.