Giant Cells in the Gonads of the Indian Desert Gerbil, *Meriones hurrianae* Jerdon, on Exposure to Internal Irradiation

When mammalian testis is subjected to high doses of irradiation, giant cells appear in the seminiferous epithelium. Occurrence of 2 kinds of giant cells has been reported in rodents[1-6], monkey[7] and man[8]. One is a hypertypic cell possessing a large body of cytoplasm with a single nucleus, while the second type contains from 2 to many nuclei in a common pool of cytoplasm. Giant cells have rarely been observed in the ovary.

While studying the effects of internal Ca^{45}, Co^{60} and P^{32} in the testis of the Indian desert gerbil, only multinucleated giant cells were observed in the seminiferous epithelium. Intraperitoneal injection of P^{32} (3 μc/g body weight) resulted in the formation of multinucleated giant cells possessing 2–8 nuclei; most of them were derived from young spermatids, the rest being formed by the spermatocytes (Figure 1). Intraperitoneal injection of Ca^{45} and Co^{60} (2 μc/g body weight) revealed no giant cells in gerbil testis. When Ca^{45}, in the form of $CaCl_2$, was injected intratesticularly (10 μc per testis), numerous multinucleated giant cells were noticed in the tubules as early as 4 h after injection (Figure 2). Most of them were formed by the fusion of young spermatids; as many as 30–70 nuclei could be seen in a common pool of cytoplasm. Multinucleated giant cells were also encountered in the testis when Co^{60} was administered intratesticularly (5 μc per testis).

Multinucleated giant cells are formed either by multiple division in the absence of cell cleavage or by cell fusion. The giant cells encountered in the gerbil testis are formed

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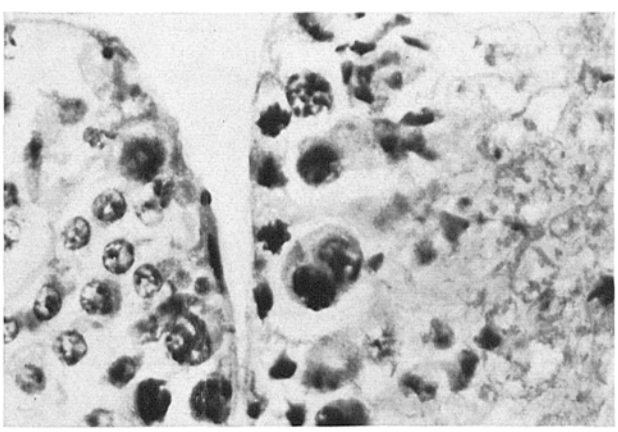

Fig. 1. Cross section of the testis 3 days after 270 μc P^{32} (3 μc/g body weight) injection. Note the binuclear giant cell formed by spermatocytes. × 760.

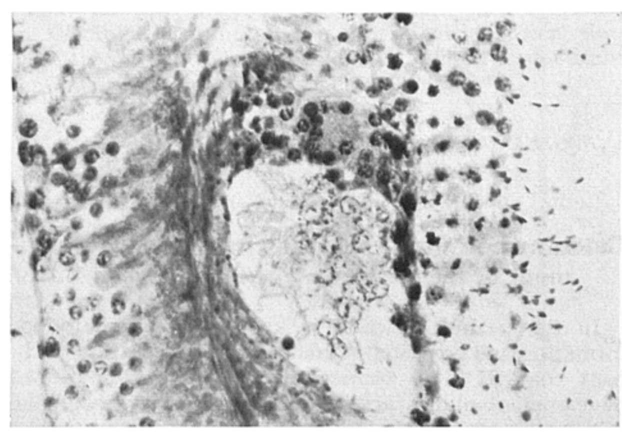

Fig. 3. Cross section of the testis 4 h after 10 μc Ca^{45} intratesticular injection. Note the giant cell undergoing liquefaction necrosis. × 320.

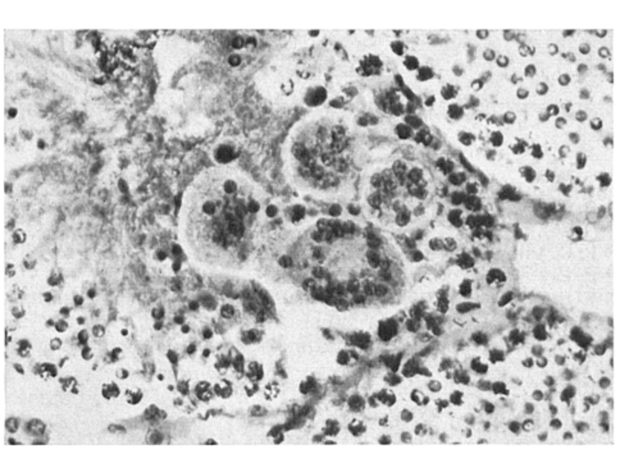

Fig. 2. Cross section of the testis 4 h after 10 μc Ca^{45} intratesticular injection. Note a number of multinucleated giant cells. × 320.

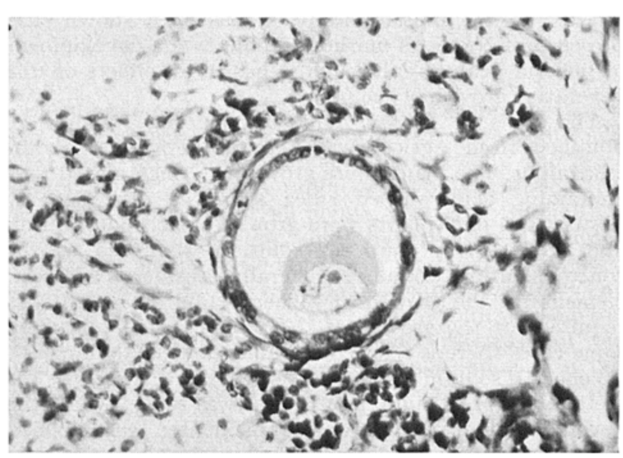

Fig. 4. Cross section of the ovary 15 days after 180 μc P^{32} (3 μc/g body weight) injection. Note the large oocyte surrounded by a single layer of granulosa cells. × 320.

by cell fusion, possibly by fatty degeneration of cell membrane. MONTGOMERY et al.[9] have observed multinucleated giant cells which had been formed by the fusion of plasma membranes after X-ray irradiation in Chang liver cell culture. The suggestion that the multinucleated giant cells are formed when macrophages swallow young spermatids[8] needs critical study. Giant cell formation is an irreversible phenomenon and these cells ultimately undergo degeneration or liquefaction necrosis (Figure 3).

Giant cell formation in the ovary is a rare phenomenon. MANDL[10] reports the occurrence of giant cells in the mouse ovary exposed to very high doses (over 1000 R) of X-ray irradiation. Here, the giant cells are characterized by the large oocytic cytoplasmic bodies surrounded by a single layer of cuboidal granulosa cells. Several such giant cells have been noticed in the ovary of the gerbils (Figure 4) subjected to internal P^{32} irradiation (3 μc/g body weight). As regards their formation, 2 possibilities may be considered: (a) following irradiation, the oocyte of small follicles, having a single layer of cuboidal cells, may show accelerated growth of cytoplasm unaccompanied by increase in the layer of surrounding granulosa cells; (b) the oocyte may continue to grow normally, but the multiplication of granulosa cells and layers may not take place and, in this case, the giant cell represents a medium-sized follicle. This is quite possible since the granulosa cells of growing follicles are highly vulnerable to P^{32} irradiation as they incorporate a good amount of this isotope. Like giant cells in the testis, these ovarian giant cells ultimately undergo degeneration[11].

Zusammenfassung. Die vielkernigen Riesenzellen sind bei der Wüstenmaus *Meriones hurrianae* Jerdon in den Samenepithelzellen nach Injektion von Ca^{45}, Co^{60} und P^{32} nachgewiesen worden. Sie wurden bei der Verschmelzung der Spermatozyten und Spermatiden gebildet. Die Riesenzellen sind im Eiersack nach Einführung von P^{32} beobachtet worden. Der Eiersack bestand aus vielen grossen Oocyten, die von einer einzigen Lage Glomerulosazellen umgeben sind.

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Calcium-Sodium Interaction in the Pod Development of the Peanut, *Arachis hypogaea* L.

In the peanut, calcium is known to stimulate pod formation and contribute directly to the formation of the fruit coat. It is to be supplied to the region of pod development and is absorbed directly by the pegs and developing fruits[1]. On the other hand, the presence of calcium in the nutrient solution has been observed to affect the uptake of other ions[2]. In general, calcium inhibits the rate of sodium absorption[3], but promotes the uptake of potassium[4], sulphate[5], chloride[6], and phosphate[7]. In the present study, it has been shown that presence of Na^+ ions markedly inhibits the development of pods in peanuts, although it has no ill-effects on the vegetative growth of the plants.

The seeds of *Arachis hypogaea* var. Big Japan were obtained from Agricultural Research Station, Sabour, Bhagalpur. The plants were grown in 12 inch glazed pots containing acid washed silica sand, as described by HEWITT[8]. 5 or 6 plants were grown in each pot. ARNON and HOAGLAND's[9] nutrient solution was used as the control solution. Sodium is generally considered as 'inert' element for the growth of higher plants, although it is required for the growth of the plants, and, at least in some cases there is a specific requirement of sodium[10,11]. To check if sodium could modify the growth effects or the metabolism of calcium, another set was run in which the normal nutrient solution was supplemented with 0.006 M NaCl/l of nutrient solution. The nutrient solution was given to the plants thrice a week and distilled water was given once a day every day. The 4 harvests were taken at different growth intervals viz. 25, 40, 55 and 70 days,

Showing the changes in dry weight of different parts of peanut, expressed in g/plant, at first harvest (25 days) and second harvest (40 days).

	Control	Na^+ set
First Harvest		
Root	0.35	0.35
Stem	0.41	0.37
Leaves	0.99	1.32
Entire plant	1.75	2.04
Second Harvest		
Root	0.68	0.56
Stem	1.90	1.46
Leaves	2.26	2.44
Entire plant	4.84	4.46

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