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精巣発生に見られる細胞異常について、ミツモンカハグラに於ける巨大精母細胞と生殖細胞の退化現象についての研究を示しています。
ON CELL ABNORMALITIES DURING THE SPERMATOGENESIS

I. Giant Spermatocyte and Cell-Degeneration in a Stone fly, Acroneuria jözoensis Okamoto

BY

HIDEGOROH ITOH

(With 4 Text Figures and 1 Plate)

I. Giant Spermatocyte

In my spermatogenetical study on a species of the stone fly, Acroneuria jözoensis Okamoto, abnormal giant cells were noted in the heterotypic mitosis. Fig. 1 shows a case of multiple chromosome groups of this species. The normal chromosomes of the animal in the first maturation division are known to be thirteen in number (Fig. 4). However, there are about twenty-six chromosomes in the present case. Abnormalities of this type have been reported by a number of authors from other materials. Henking (1891), Paulmier (1899), Gross (1904) also found such instances. Wilson (1906) reported in Anasa tristis a number of oogonal cells containing forty-four chromosomes, instead of the normal number of twenty-two. He suggested that the presence of this multiple chromosome groups was due to the fact that, “all the chromosomes divided once without the occurrence of cytoplasmic division.”* Randolph (1906) found in the earwig, Anisolabis maritima, occasional giant nuclei with double the number of the normal chromosomes. Metz (1916) observed in the Diptera, mainly in Sarcophaga and

* Wilson (1906)

"Funcellia," "certain cases of multiple chromosome numbers (tetraploid, or higher multiple). In these cases corresponding chromosomes were associated in prophase in aggregations of four, eight, etc., instead of being arranged in pairs".*

Goldsmit (1919) also reported that multiple chromosome groups occur in the first spermatocyte division in the tiger beetle.

According to Junker (1923), in Perla marginata, a number of tetraploid chromosome groups are found in spermatogonia and in the second maturation division, but not in the first spermatocyte mitosis. He found giant spermatozoon also in his material.

In the present specimen tetraploid chromosome groups are found in heterotypic division. They are, however, very rare, occurring only in two individuals among about one hundred males. One of them contains only one giant spermatocyte while the other has a few giant cells. Though it is impossible, naturally, to inquire into the fate of giant cells very closely, it is interesting to consider the fact in connection with the mutations of an animal etc. Fig. 2 shows the tripolar spindles of a giant spermatocyte which suffers from a slight plasmolysis. Fig. 3 indicates a clumped multiple chromosome group undergoing

* Marz (1916)
degeneration. In all giant spermatocytes in these preparations, whole metaphase chromosomes accomplished their tetrad formation, showing the characteristic tetrad forms.

A report on the abnormal giant cells in the grows-period of the first spermatocyte and giant spermatids, found in the present specimen, will be publish in order.

II. Cell-degeneration during the Spermatogenesis.

As Junker and Nakahara reported respectively in their spermatogenetical studies on Stoneflies, cell-degeneration takes place very frequently in the present species during the spermatogenesis. The phenomenon is found in all individuals without exception, though it differs more or less in degree.

Fig. 3. Microphotograph of two giant spermatocytes. One of them commences to degenerate showing the chromosomal clumption.

Fig. 4. Microphotograph of metaphase chromosome groups in the normal heterotypic division.

Sometimes a cell degenerates singly, but usually all cells contained in one cyst degenerate simultaneously. The cell-degeneration is found in every stage from the primary spermatogonium to the spermatids. At first many small condensed chromatin masses connect with each other forming net-like work as the process advances. This net-like work has a strong staining capacity.
Then the spaces between the chromatin-nets are reduced by degrees hand in hand with the contraction of the nucleus. Finally the nucleus becomes homogeneous making a compact mass which is stained deep black or blood-red by iron-hoematoxylin or safranin respectively. This compact chromatin sphere becomes smaller, until it completely disappears being resorbed.

The construction of the cytoplasm in the degenerating cells is also destroyed as the nuclear degeneration advances.

Though the cell-degeneration occurs mainly in the final spermatogonial telophase, it happens in every stages during the spermatogenesis. Namely, it sometimes takes place also in the growth period of the first spermatocyte, in the first and the second maturation division and in the spermioteleosis. In the meantime, it happens occasionally in the young spermatogonium.

**LITERATURE**

Explanation of Plates

Fig. 1. The cell-degeneration in the primary spermatogonium. Chromatin net-like works are found in the primary spermatogonium, at the middle part of the plate. At the left side of the plate, many compact masses of the degenerating nuclear substances of the secondary spermatogonium are seen.

Fig. 2. The cell-degeneration in the secondary spermatogonium.

Fig. 3. The cell-degeneration of a whole cyst of the primary spermatogonium, at the right side of the plate. The cell-degeneration of the primary spermatocyte in the growth period is found at the left side.

Fig. 4. The cell-degeneration in the secondary spermatogonium, early stage of the process in the lower part, very advanced stage at the upper.

Fig. 5. The cell-degeneration of the primary spermatocytes in the growth period.

Fig. 6. Degenerating spermatids, early stage at the middle part of the plate, advanced stage at the right.

Summary

The presentation of plates is as follows:

Fig. 1. The cell-degeneration in the primary spermatogonium. Chromatin net-like works are found in the primary spermatogonium, at the middle part of the plate. At the left side of the plate, many compact masses of the degenerating nuclear substances of the secondary spermatogonium are seen.

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Fig. 6. Degenerating spermatids, early stage at the middle part of the plate, advanced stage at the right.

Summary

The summary of the presentation is as follows:

The cell-degeneration in the primary spermatogonium is characterized by chromatin net-like works found at the middle part of the plate. At the left side, many compact masses of the degenerating nuclear substances of the secondary spermatogonium are evident. The cell-degeneration in the secondary spermatogonium is also visible at various stages, from early to advanced, with a whole cyst and primary spermatocyte growth period being highlighted.

The cell-degeneration in the secondary spermatogonium, early stage of the process at the lower part and very advanced stage at the upper part, is depicted. The cell-degeneration of the primary spermatocytes in the growth period is found at the left side, with a whole cyst and primary spermatocyte growth period being highlighted.

Degenerating spermatids are shown at different stages, with early stage at the middle part and advanced stage at the right.

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