



Title	精蟲發生に見られる細胞異常： .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
Author(s)	伊藤, 秀五郎
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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)

精蟲發生に見られる細胞異常

I. ミツモンカハゲラに於ける巨大精母細胞と生殖細胞の退化現象

伊藤秀五郎

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 oogonial 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".* GOLDSMITH (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 sper-

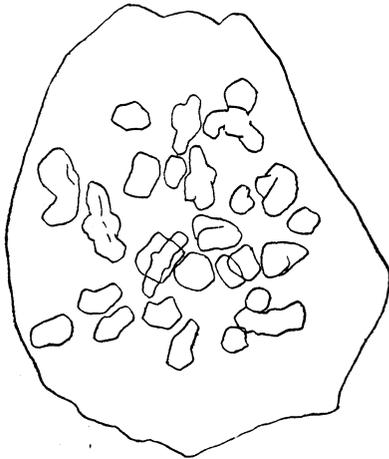


Fig 1

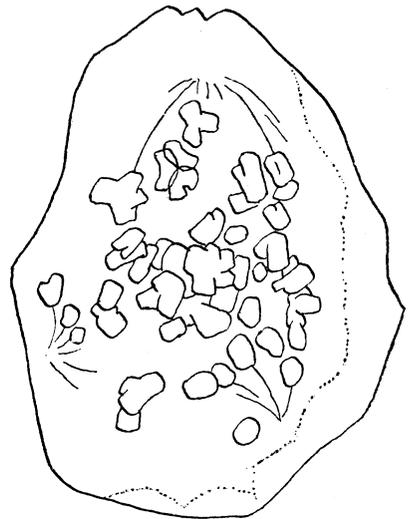


Fig 2

matocyte 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

* METZ (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.

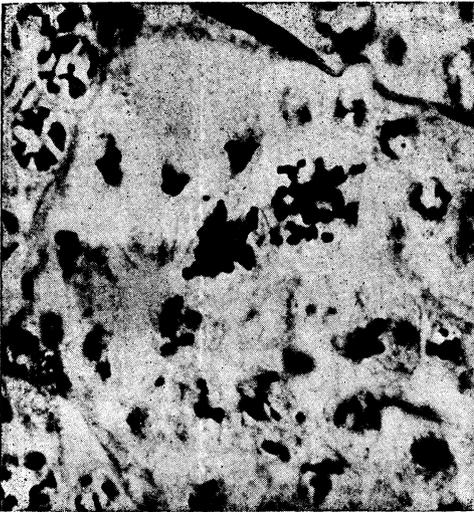


Fig. 3.

Microphotograph of two giant spermatocytes. One of them commences to degenerate showing the chromosomal clumpton.

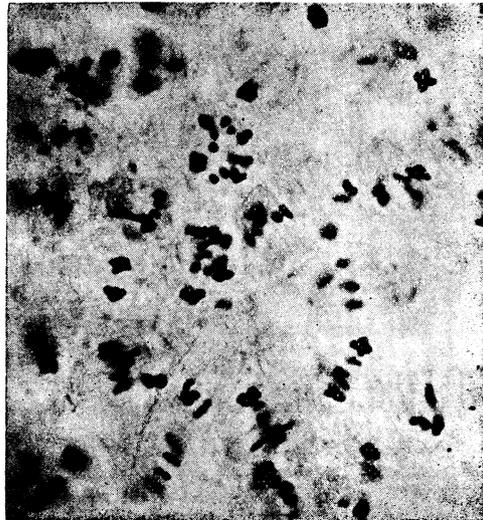


Fig. 4.

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

1. GOLDSMITH, W. M., 1919. A comparative study of the chromosomes of the tiger beetles (Cicindelidae). Jour. Morph. Vol. 32
2. GROSS, J., 1904. Die Spermatogenese von *Syromastes*. Zool. Jahrb. Bd. 20
3. HENKING, H., 1891. Ueber Spermatogenese, etc., bei *Pyrrhocoris apterus*. Zeits. f. wissensch. Zool. Bd. 51
4. JUNKER, H., 1923. Cytogishe Untersuchungen an den Geschlechtsorgane der halbzwittrigen Steinfliege, *Perla marginata*. Arch. f. Zellf. Bd. 17
5. METZ, C. W., 1914. Chromosome studies on the Diptera. I. A preliminary survey of five different types of chromosome group in the genus *Drosophila*. Jour. Exp. Zool. Vol. 17
6. MONTGOMERY, T. H., 1898. The spermatogenesis of *Peripatus balbouri*, up to the formation of the spermatid. Zool. Jahrb. Bd. 14
7. NAKAHARA, W., 1919. A study on the chromosomes in the spermatogenesis of the stone-fly, *Perla immarginata* Say, with special reference to the question of synapsis. Jour. Morph. Vol. 32
8. PAULMIER, F. C., 1899. The spermatogenesis of *Anasa tristis*. Jour. Morph. Vol. 15, Suppl.
9. RANDOLPH, H., 1908. On the spermatogenesis of the earwig, *Anisolabis maritima*. Biol. Bull. Vol. 15
10. RAN, W., 1925. Ursprung der mönlichen Keimzellen und chromatische Vorgänge bis zur Entwicklung des Spermatocyten. Zeits. f. Anat. Entw. Mech. Bd. 76
11. WILSON, E. B., 1906. Studies on chromosomes. III. The sexual differences to the chromosome groups in Hemiptera, with some considerations of the determination and inheritance of sex. Jour. Exp. Zool. Vol. 3

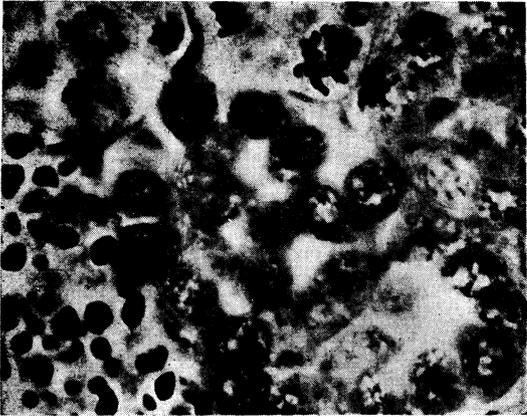


Fig. 1

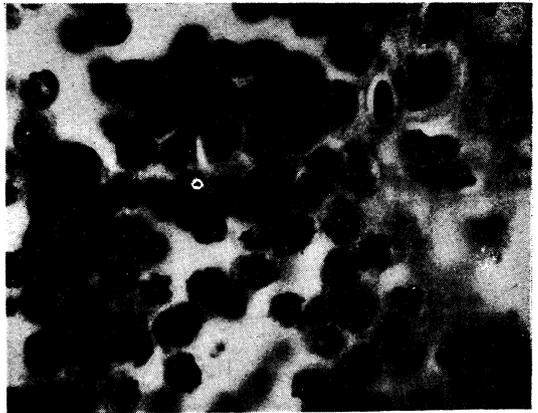


Fig. 2



Fig. 3

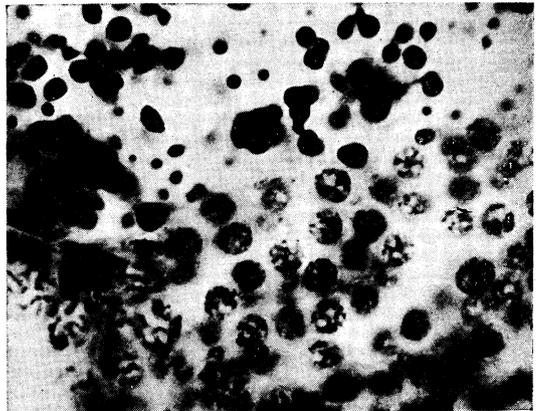


Fig. 4

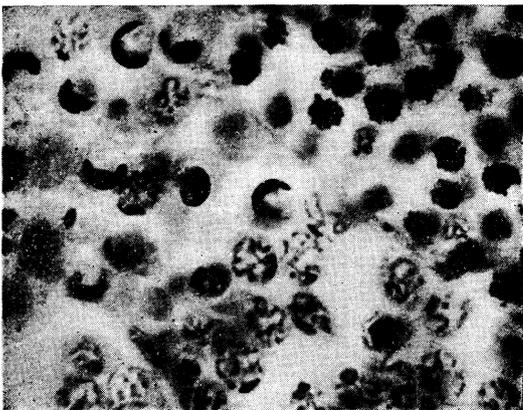


Fig. 5

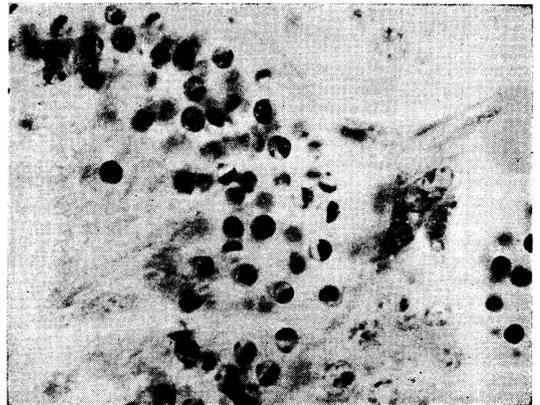


Fig. 6

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.

摘 要

横翅目カハゲラ科の一種、ミツモンカハゲラの精虫発生に見られる、生殖細胞の異常現象として著しいのは、巨大精細胞と、細胞の退化である。

巨大精細胞は、私の検鏡した材料では、約百個体の中、二個体に於て見出された。第一次精母細胞の生長期、第一成熟分裂の分裂中期、及び精細胞の各時代に見出されたが、何れもその数は極めて少く、第一成熟分裂の分裂像に現れたものは、一つの場合は唯一個、他の一つの場合でも數個の細胞に過ぎない。他の時代のものに於ても同様にその数は甚だ少い、従てその起原と運命を追求することは出来なかつたが、第一分裂に現れた巨大精母細胞の有する染色体数は常数の十三個の二倍の二十六個である。但しその多くは染色体の凝集を引起して退化過程に入りつつあつて、ほぼ正確に染色体数を数へ得たものは唯一個であるから、かかる巨大精母細胞が常に四價の染色体群を有してゐるか否かは断定出来ない。

この種類では、雄性生殖細胞の退化は、何れの個体にも見出される現象で、而も第一次精原細胞から精細胞に至るまでの各時代のあらゆる時期に起るものである。多くの場合一つの cyst に含まれる總ての細胞の間に同時的に起るもので、ある個体では精巢の殆ど總体が、かかる異常現象を呈してゐる場合すら見出される。退化過程は最初核に起るが間もなく細胞質も破壊され、核質は凝集して染色度の極めて強い球体となり、遂には吸収されて消失して了ふ。この現象は他の種類でも同様に存在するから、一般にカハゲラ科に屬する昆虫に共通の現象と思はれる。