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ON AN OVO-TESTIS 1) FOUND IN A LARVA OF LOCUST, PODISMA SAPPOROENSE SHIRAKI.

BY

BUKÔ NATORI

(With one Plate)

In the suburbs of Sapporo, Podisma sapporoense Shiraki is found abundantly. During the investigation of chromosomes of this locust in 1927, I found by chance one case of an ovo-testis in fifty males examined. In the adult of the insect, the size of the female is considerably larger than the male, but in the larva, especially in the early stage, the sexual difference can scarcely be distinguished by the body size. Therefore, identification of the sex of the larva is secured only by the external genital organs. By this method, it is ascertained that the gynandromorphic locust under consideration is a normal male in appearance.

In insects, many investigators such as Junker (Perla 1923), Boveri (Bee 1888), Whitting (Habrobracon 1927), Morgan and Bridges (Drosophila 1927), Pearson (Katydids 1927, 1929), Ômachi (Madasumma 1926) and Kornhauser (Thelia 1919) have already studied on the subject. Among others Pearson's investigation is very important in the recent research of morphology of chromosomes. He found as many as three different types of appearance of the gynandromorphic individual which are otherwise normal in cytological condition.

However, the frequency of the gynandromorphic individual is by no means great; it has been described to occur in the Drosophila once in one thousand individuals and in the Katydids once in five hundred individuals.

The material on which I proposed to work cytologically was fixed in the strong Flemming's solution, and cut into serial sections 10 μ in thickness. They were stained with Heidenhain's iron haematoxylin.

In the ovo-testis dealt with, a mass of ovarian tissue is attached to a testis.

1) After Cheng (1929) and Makino (1931).

The diameter of the ovarian part measures about 800 µ while the size of the testicular part is normal, that is about five times as large as the size of the ovarian part (Fig. 1). Both ovarian and testicular parts show apparently no aberrant structure except chromosomes.

The chromosome number of the normal male, as Prof. Oguma has studied, is 23 (Fig 2), and all of the chromosomes have telomitic spindle fiber attachment, representing the so-called Hippiscus type after McClung (1914). However, when I examined the chromosomes of the spermatogonium of this material, I found an astonishing fact that one is unable to account for without difficulty.

In the spermatogonium (Fig. 3, 4, 5), the chromosomes are found always 22 in number (even), instead of 23 as counted in the normal male. It suggests that the difference of the chromosome number in the spermatogonium is due to the linkage of some chromosomes which might be recognized by split or constriction of chromosome, as known already in many animals. But in the present material, so far as observed, there is no abnormal split or constriction which indicates the traces of the association of some chromosomes.

In the first spermatocyte, I found eleven tetrads of autosome and one dyad of sex-chromosome as found in the normal male, that is to say, it is to be analysed into twenty three univalent chromosomes as observed in the normal male. It is expected, therefore, that during the prophase of the first spermatocyte division, the increase of one univalent chromosome will take place, but there is so far no trace of such phenomenon as to prove increase of chromosome number.

In the second spermatocyte, two kinds of daughter cells are produced. These are the no-x-class and the x-class nuclei. In the former there are contained eleven autosomes and one sex-chromosome, while in the latter the sex-chromosome is missed. In both kinds of nuclei all chromosomes take the dyad-form.

The sperm formation is normal and the sperms fill the cysts, but in some cysts the spermatozoa degenerate and the epithelium of the cysts thickens slightly more than usual.

The ova found in the ovo-testis, have various sizes. They are all in the growth period and no ripe ovum is found (Fig. 1, 6). The largest follicle
measures 250μ x 120μ in diameter and the smallest one 100μ x 46μ. By high magnification, I found in the ovum the cytoplasm which contains deuto-plasmic granules, and a large vesicular nucleus (Fig. 7).

The nucleus contains a loosely arranged karyotin network and one nucleolus, in which some irregular karyotin granules are observed.

Many degenerating and degenerated ovarian follicles are observed beside a small number of young follicles (Fig. 6). In all the follicular epithelium of the ovo-testis, many cells are in the process of cell division, but they are flat in shape, instead of having reached the stage in which the cylindrical epithelial cells are found. Some of the follicles have degenerated already at this stage.

Briefly, in the ovo-testis found in a larval locust, the spermatogonia lack one chromosome. In spite of this fact, spermatogenesis is accomplished and ripe speromatozoa are produced abundantly. The development of the ovum, on the contrary, is retarded greatly as compared with the spermatogenesis and they are all seen degenerating.

It is a pleasure to acknowledge here my deep indebtedness to Prof. K. Oguma by whose suggestion this work was undertaken and under whose helpful supervision it was finished.

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Explanation of figures.

Fig. 1. Showing the ovo-testis. The spermatozoa in the cysts and the largest vesicular follicle in which a nucleus with one nucleolus is located. Photomicrograph. (× 50).

Fig. 2. The metaphase of the spermatogonia in the normal individual. Showing the twenty two autosomes and one sex-chromosome. Drawing. (× 2500).

Fig. 3. The metaphase of the spermatogonia in the gynandromorphic individual. The same number of chromosomes as in Fig. 4, 5. Drawing. (× 2500).

Fig. 4, 5. The metaphase of the final spermatogonia in the gynandromorphic individual. The even chromosome number (22) and the slender forms as compared with those in Fig. 3 are shown. Drawing. (× 2500).

Fig. 6. A part of the ovary in the ovo-testis. cd, cell division of the follicular epithelial cell. yo, young ovum. df, degenerating follicle. nl, nucleolus. Photo. (× 150).

Fig. 7. A vesicular follicle. dg, deutoplasmic granule. fc, follicular epithelial cell. n, nucleus. y, yolk. cd, cell division of a follicular epithelial cell. nl, nucleolus. Photo. (× 550).
ネトリ：オヴォテストスを発見したラブラ・コン・セデント、ポディズマ・サポロエンス・シラカイ

摘要

アシマグラフキバッタ（Podisma sapporoense Shiraki）の
幼虫に見出されるovo-testis に就て。

名 取 武 光

余は 1927 年、札幌近郊に於て普通に見られるアシマグラフキバッタの染色体の研究に従事した。其材料中内観は正常の雄であるにも係らず ovo-testis を有する個体を偶然発見した。元来雌雄同種の個体は極めて稀に発見されるので果察では千個体中一、四発見では五百個体中に一位の割合に存在すると報告されている。

余の材料に於ける ovo-testis は普通大の testis に略 800 μ の直径を有する卵巣成が附着して在るものである。之を細胞学的に観察した所が精原細胞於て染色体が一つ不完全でなる事実を発見した。アシマグラフキバッタの精原細胞於ては二十三個の染色体を見るべきであるにも係らず二十二個の偶数である。其一に個性染色体於ては常染色体である。然らに精原細胞於ては十二個の染色体を見この中一箇は dyad form の性染色体で他の十一箇は tetrad form の常染色体である。をして其と第一分裂の前期に於て univalent の染色体が一個増加させて居る事である。共處で想像される事は精原細胞の染色体の linkage である。然し余の観察し得た範囲では此の現象を説明するに足る染色体の split 又は constriction 等の痕跡を見出し得なかった。又第一分裂の前期に於ても染色体の増加を従し得る様な現象を見ない。

前の如く染色体の異常が居るにも係らず精虫発生は、各分裂の中期の染色体の配列が多少不規則である外は何等差支なく進行され cyst には成熟した精虫が充てて居る。之に反し卵巣に於ける卵子の発育は精虫のそれに比し遥かに遅く未だ成熟せる卵子を見ないのみならず既に形成された卵子も退化の途命を辿ってる様に観察される。

（北海道帝大農学部動物学教室）