54. On the Chromosomes of Three Species of Gryllodea.

By Fumiye OHMACHI.

Zoological Institute, Faculty of Agriculture, Tokyo Imperial University.

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In addition to a series of cytological studies on Gryllodean insects, I have been able to ascertain the spermatogonial chromosomes of three species, which shall be described in this paper.

1) *Trigonidium cicindeloides* Rambur. This species, which belongs to the subfamily Trigonidiinae, is a very small insect. It is notable for the peculiarity that the tegmina of males and females are alike; that is, the tegmina of the males are not provided with sound producing apparatus and the veins are longitudinal and simple.

In the spermatogonial metaphase (Figs. 1-3), eleven chromosomes are counted: one of the smallest numbers in Gryllodea. They are all

Fig. 1.

Fig. 2.

Fig. 3.

V-shaped and are of every grade forming a series of homologous pairs of graduated magnitude from the smallest to the largest. Some of them are homobrachyial and others heterobrachyial. One of these V's is the X-chromosome, which is distinguished by its slender form. It takes always the peripheral position, the apex turning to the centre. It manifests various shapes according to its relative position in the equatorial plate and also to other conditions; but when well stretched out it takes the typical shape of the X-chromosomes which I emphasized to be peculiar to the subfamilies Gryllinae and Eneopterinae. Its arms are not equal and the longer one is bent at the middle part. It is remarkable that this species has peculiar X-chromosomes similar to those of the main group of Gryllodea.

A small black staining sphere is found in the spermatogonial metaphase. Whether it is a chromatoid body or a supernumerary m-chromosome shall be determined later.

2) *Paralandrevus coriaceus* Shiraki. (?) This species, which belongs to the subfamily Gryllomorphinae and which was collected in Awaji Island by me in 1931, is a rather large insect in Gryllodea. Its exact identification shall be carried out later.

The spermatogonial chromosomes of this species consists of eighteen autosomes with an X-chromosome (Figs. 4-6). The autosomes are all

Fig. 4.

Fig. 5.

Fig. 6.

rod-shaped of various length from the sphere like small ones to the longest. They may be arranged into a series of homologous pairs. In some spermatogonial metaphases of certain cysts, all the chromosomes assume a rather thick and swollen form (Fig. 5). The characteristics of the X-chromosomes of this species exactly conform to those just described for the preceding species.

Tateishi (1931) announced in his discourse at the Seventh Annual Meeting of the Zoological Society of Japan the spermatogonial chromosome number of another species of *Paralandrevus*—*P. coulonianus* Saussure—as nineteen. Considering the chromosome number only, that species may be very near to my present species, though he did not describe the chromosome shape in his résumé.

3) *Brachytrupes portentus* Lichtenstein. Tateishi (1931) has already published a note on the chromosomes of this large Formosan cricket. I had the opportunity to study the chromosomes of this species myself through having the materials given me by the courtesy of Mr. Sonan, to whom I express my hearty thanks here.

Tateishi found three classes of combinations of spermatogonial chromosomes; namely, class A: $4\text{ V's} + 10\text{ rods} + \text{X} = 15$, class B: $5\text{ V's} + 8\text{ rods} + \text{X} = 14$, and class C: $6\text{ V's} + 6\text{ rods} + \text{X} = 13$. As is manifest, the number variation is caused by linkage of two rods forming a V-chromosome. If we assume that V's are composed of two component rods, then all these formulae are reduced to the same basic type, $18\text{ rods} + \text{X} = 19$.

In one individual, each of the two testes of which was cut in

two and fixed with four different fixatives, I observed a different condition. In two preparations, I counted fourteen spermatogonial chromosomes (Figs. 7-9) like Tateishi's class B, but they consist of

Fig. 7.

Fig. 8.

Fig. 9.

6 V's and 7 rods with an X. It resembles his class C, having six V's, but it has one more rod. It may be supposed that one of the rods took the form of a V, the point of fibre attachment having shifted from the terminal to the median position, thus giving rise to a heteromorphic homologous pair. But, in reality, this can not be considered correct. In a preparation, which was fixed with very dilute Flemming's mixture, all the V's are dissociated into two component rod elements, so that I can count nineteen rods with an X, one more than that of Tateishi (Figs. 10, 11).

Fig. 10.

Fig. 11.

Fig. 12.

How shall we explain this fact? It is very rare that diploid autosomes exist in odd number. An explanation may be that one chromosome exists in triples caused by non-disjunction. My later studies shall be devoted to the explanation of this fact.

In another individual, which I got later, I observed in the spermatogonial metaphase 4 V's and 10 rods with an X (Fig. 12), Tateishi's class A. The X-chromosome of this species has the characteristics peculiar to Gryllidae.