Pachytene Map of a Chromosome in the Grasshopper

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The object of the present study is to identify one chromosome in the grasshopper Chorthippus bicolor, Charp. in the meiotic prophase of the testis. The material was collected at Aberlady (Scotland).

Fixation and staining

It seemed worth while to investigate the effect of delayed fixation on the fixability of chromosomes. Three methods of removing the testes were adopted:

1—The animals were killed by cutting their heads and the testes removed immediately.

2—The animals were killed by ether and the testes removed after 1, 2, 3 and 4 hours respectively.

3—The animals were killed by HCN and the testes removed after 4 hours.

In each case the testes were removed while the animals were covered with acetocarmine.

One preparation was made from two or three follicles. After fixation

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Fig. 1 a

Fig. 1 b

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two or three of those follicles were placed on an albuminized slide in a drop of acetocarmine and covered with a piece of cellophane or cover-slip and squashed. They were then placed in a staining jar, containing water, for about 5–10 minutes till the covers separated. The squashed material remained fixed to the albuminized slide and was hydrolyzed for 5 minutes in normal hydrochloric acid at 55–60°C and then stained in hot basic fuchsin (not decolorized) for 10 minutes. It was washed three times with water, bleached in SO₂ water, dehydrated in an increasing alcohol series, mounted in euparal and covered with a cover-slip.

**Examination of the material**

Observations were made with a 95 × 1.25 N. A. oil immersion objective and 10 × eyepiece.

It was found that the slides prepared from insects killed by ether and prepared after 1 hour were the best of all. It was from these that all the drawings were made. The stage used for drawing was full pachytene, when pairing is complete in all chromosome pairs but separation has not yet started. Drawings were made with a camera lucida at 4600 ×, a 30 × eyepiece being used for general outline and a 10 × eyepiece for filling in the details.

From observation, the diploid number of chromosomes in the male was found to be 17, which agrees exactly with data given by Davies (1908), Gerard (1909) and Meek (1913).

**The chromosome map**

One chromosome was identified and drawn from different cells. It does not appear always exactly the same; but while there is a certain amount of variation, there are places which are identical in all cases of the same chromosome. The accompanying chromosome map is a composed drawing of six cases of the same chromosome. Under the chromosome map, there is a reference line on which the total length has been divided into parts which are identical in the same chromosome from different cells. The approximate position of the centromere, indicated by the light area in the pachytene stage, is marked by a black rectangle on the reference line. The chromosome measures about 24µ. In addition to the map there is a drawing and a microphotograph of the chromosome.

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References