

KIHARA INSTITUTE FOR BIOLOGICAL RESEARCH
Misima, Japan

1. Pachytene pairing in translocation heterozygotes having a huge knob close to the breakpoint.

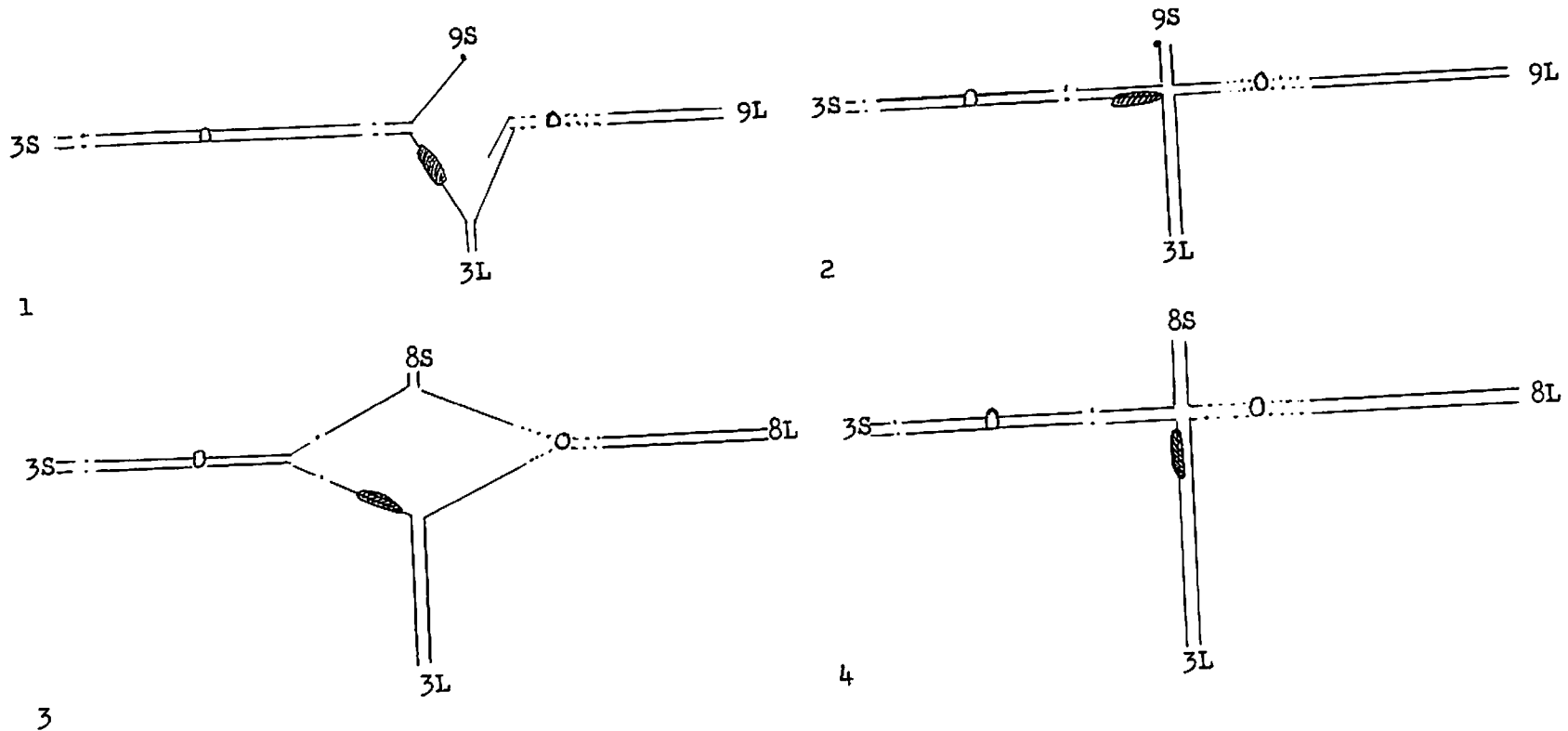
An exceptionally huge knob ($3L^{111}$) was found by the present author on the long arm of chromosome 3 (position .58) in an inbred line, N. C. Inb. No. 12, derived from the variety Jarvis Golden Prolific (Ohta 1965, Maize News Letter 39:142).

To examine the effect of this huge mass of heterochromatin on synapsis during meiotic prophase, two translocation heterozygotes having the breakpoint close enough, one proximal and the other distal, to the knob position were selected for hybridization to the inbred line. Strains T3-8h, the breakpoint at .53, and T3-9F, at .63, were obtained from Dr. E. B. Patterson, for which the author is grateful to him. They were crossed to the inbred line, $3L^{111}$, and the F_1 hybrids were examined cytologically.

Pachytene pairing in a translocation heterozygote, $3L^{111}/T3-9f$, was analyzed. Three major types were found:

1. Complete asynapsis or asynapsis in each of the four arms of the cross-shaped configuration in segments adjacent to the breakpoint was observed in about 50 per cent of the cells analyzed. The lengths of asynaptic arms varied; Fig. 1 shows an extreme case.
2. Asynapsis in two or three arms of the cross-shaped configuration was observed in about 35 per cent of the cells.
3. Complete homologous pairing throughout the cross-shaped configuration was found in the rest of the cells (Fig. 2), in which two cases existed: either the huge knob paired with the knobless homologue or it folded back on itself in a U-shape (partly non-homologous pairing in a strict sense).

In the most extreme case of (1) the asynaptic segment was as long as about two-fifths of the length of the long arm of chromosome 3, but no case of asynapsis beyond the centromere was observed.



Figs. 1-4. Schematic drawing of pachytene pairing of the translocation heterozygotes.

1. $3L^{lll}/T3-9f$, complete asynapsis in the segments adjacent to the breakpoint.
2. $3L^{lll}/T3-9f$, complete homologous pairing.
3. $3L^{lll}/T3-8h$, complete asynapsis in the segments adjacent to the breakpoint.
4. $3L^{lll}/T3-8h$, complete homologous pairing.

Pachytene pairing in another translocation heterozygote, $3L^{111}/T3-8h$, was also analyzed. Three major types were found: (1) complete asynapsis or asynapsis in each arm of the cross-shaped configuration in the segments adjacent to the breakpoint (Fig. 3), (2) complete homologous pairing throughout the cross-shaped configuration (Fig. 4) and, (3) partly homologous pairing and partly asynapsis. The observed frequency of each of the three types was about 1 : 1 : 1.

From the above observation the following conclusion is drawn: Heterochromatin, when present in a huge amount heterozygously, prevents pairing of homologous chromomeres or ordinary chromosome segments in the region adjacent to it, but it does not affect homologous centromeres, indicating that different mechanisms are involved in the synapsis of chromomeres and that of centromeres during meiotic prophase.

Yasuo Ohta

LAWRENCE UNIVERSITY
Appleton, Wisconsin

1. Evidence for the influence of B-chromosomes on the recovery of Dp-Df chromosomes.

The recovery of duplicate-deficient (Dp-Df) chromosomes in the megaspores of plants heterozygous for Inversion 3a (breakpoints 3L.40-.95) was reported by Rhoades and Dempsey (Amer. J. Bot. 40:405-424). They demonstrated that Dp-Df chromosomes arise following crossing-over between two genes within the inverted region and subsequent bridge breakage. Recovery of Dp-Df strands was measured by inequality of reciprocal crossover classes since these chromosomes contribute to only one of the classes. Once isolated, they were followed by decreased transmission of the deficient chromosome. In their study, Rhoades and Dempsey found no difference in crossing over in megasporocytes and microsporocytes when a correction was made for the Dp-Df chromosomes in the functional megaspores.

Further studies of In 3a heterozygotes have shown that inequality of reciprocal crossover classes is not always observed, suggesting that