

Diffuse Kinetochores in the Chromosomes of the Arrhenotokous Spider Mite *Tetranychus urticae* Koch

In the eggs of the two-spotted spider mite *Tetranychus urticae* Koch (fam. Tetranychidae, Acarina) 6 cleavage divisions take place within 5 h after oviposition¹. Mitoses of these cleavage divisions were studied in squash-preparations. Eggs were fixed in an 1:3 acetic acid-alcohol mixture for 1–30 days, and stained and squashed in aceto-ironhaematoxylin-chloral hydrate according to WITTMANN².

As expected, 3 chromosomes were found in the haploid male egg and 6 chromosomes in the diploid female egg³. During metaphase the chromosomes were either rod shaped or bent or more or less V-shaped (Figure 1). However, a primary constriction or a localized kinetochore structure was not observed. These chromosomes were always entirely situated in the equatorial plane of the spindle with one of the chromatids oriented towards one pole and with the other chromatid towards the other (Figure 2, moderate squashing). Anaphasic separation of the chromatids was parallel and a sticky matrix could then be observed in various zones between the chromatids (Figure 3). During anaphase the daughter chromosomes moved apart with the long axis at right angles to that of the spindle (Figure 4) and started despiralization. At late anaphase irregularly bent chromosomes reached the poles (Figure 5).

From these data it can be concluded that the chromosomes of *T. urticae* have a diffuse kinetochore. Holokinetic chromosomes were also demonstrated by KEYL⁴ in the fresh-water mites *Eylais setosa* (fam. Eylaidae) and *Hydrodroma despiciens* (fam. Hydrodromidae). Very likely also the chromosomes of the mites *Pyemotes* (= *Pediculoides*) *ventricosus*⁵ and *Siteroptes* (= *Pediculopsis*) *graminum*⁶ (fam. Pyemotidae) have a diffuse kinetochore. Since the kinetochore condition is, generally, either localized or diffuse within an order^{7,8}, and since the species of the 4 families mentioned belong to the suborder Trombidiformes⁹, it becomes likely that the chromosomes of the species of this suborder are holokinetic.

T. urticae, squashes of male eggs with three chromosomes. $\times 1,900$.

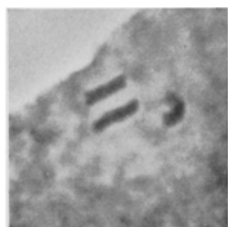


Fig. 1. Metaphase chromosomes.

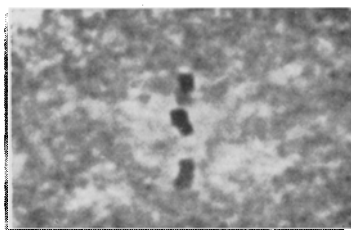


Fig. 2. Equatorial plate.



Fig. 3. Early divergence of the daughter chromosomes.

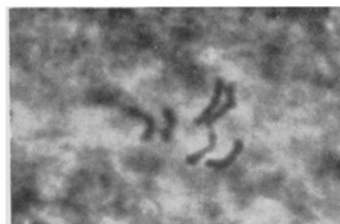


Fig. 4. Early anaphase.

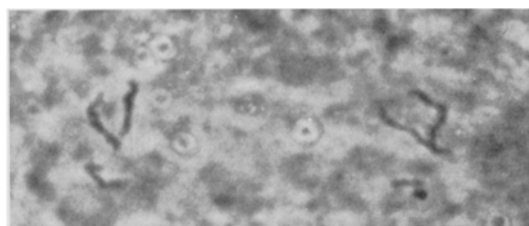


Fig. 5. Late anaphase.

In chromosomes with a diffuse kinetochore, usually asymmetric reciprocal translocations can be readily induced¹⁰. Introduction of such translocations in *T. urticae* may become of great value in population control through genetic manipulations.

Zusammenfassung. Die Chromosomen der Spinnmilbe *Tetranychus urticae* verhalten sich während der mitotischen Furchungsteilungen holokinetic.

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