Separatum EXPERIENTIA *28*, 707 (1972)
Birkhäuser Verlag, Basel (Schweiz)

Minimal Chromosome Number in False Spider Mites (Tenuipalpidae)

The superfamily Tetranychoidea (sub-order Prostigmata) includes three phytophagous families, the Tenuipalpidae, Tuckerellidae and Tetranychidae. Many species of Tetranychidae, spider mites, have been studied with respect to sex-determination. From cytological, rearing and genetic data, it is known that all bisexual spider mites have a haplo-diploid sex-determination. The chromosome numbers are low, ranging from $n=2$ to $n=7$[1]. The exceptionally low number of $n=2$ is rather commonly found in Tetranychidae and has also been reported from another prostigmatic mite family[2].

From the Tenuipalpidae, the so-called 'false spider mites', we examined the chromosome number of the bisexual species *Raoiella indica* (Hirst), occurring on date palms at Mauritius. Eggs were collected at random from infested leaves and preparations were made using the aceto-orcein squash technique. It was observed that the population consisted of both males and females in an approximate equal ratio. From 56 eggs we obtained usable chromosome preparations, being the eggs in which embryonic development was not too far advanced. 32 eggs showed exclusively 2 chromosomes, while 4 chromosomes were found in 24 eggs. The occurrence of two classes of eggs, one with 4 and the other with 2 chromosomes, supports the assumption of haplo-diploidy in this bisexual species, which is in agreement with the fact that this type of sex-determination is predominant for prostigmatic mites.

Some other species of Tenuipalpidae were investigated, which reproduce themselves by means of a thelytokous parthenogenesis. From the privet mite, *Brevipalpus obovatus* (Donnadieu), we studied two populations from different origin, one from a glasshouse in the Netherlands, one from Madagascar. Both populations were reared in the laboratory on detached leaf cultures of *Hedera helix* L. From the Dutch population, it appeared that males occurred at a very low frequency (on a total of 15,000 individuals only 12 males were scored), while the occurrence of males in the Madagascar population was even more seldom. From the Dutch population 120 eggs gave suitable chromosome preparations. All these preparations showed cells with prophases and metaphases, while other mitotic stages were also present. Two chromosomes occurred, both being small, in metaphase approximately 2 μm in length. No peculiar features could serve as a tool for a decision concerning homology of both chromosomes, despite the large amount of material examined. From the Madagascar material 20 egg preparations were made, in which constantly 2 chromosomes were found (Figure).

Besides *B. obovatus*, 2 related thelytokous species from Madagascar were examined, *viz. B. phoenicis* (Geyskes) and *B. californicus* (Banks). For both species it could be stated that also 2 chromosomes occurred.

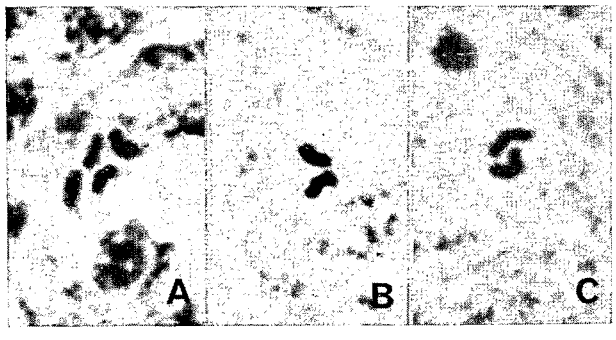
The interpretation of the occurrence of 2 chromosomes in embryonic tissue of the 3 thelytokous *Brevipalpus* species offers difficulties in that no data concerning the number and behaviour of chromosomes in the germ line are available. Our trials to investigate the chromosome cycle during oogenesis failed. Moreover, the small size of the chromosome prevents any conclusion on the possible homology of the 2 chromosomes seen at different mitotic stages.

Despite this lack of essential information, the most simple explanation would be to assume that the females of this species are diploid in their soma and that the basic number of chromosomes is $n=1$. The assumption of female haploidy is less attractive, since this condition has never been found in any animal species under natural conditions. Also for genetic reasons it is difficult to believe that female haploidy can evolve in a group where male haploidy is the predominant type of sex-determination.

Zusammenfassung. Es wurde bei 3 *Brevipalpus*-Arten mit thelytoker Reproduktion festgestellt, dass Zellen in embryonalem Gewebe nur zwei Chromosomen haben und vermutlich ein einfaches Chromosom-Komplement darstellen ($n=1$).

W. Helle, H. R. Bolland and J. Gutierrez

Laboratory of Applied Entomology, Linnaeusstraat 2B, Amsterdam (Netherlands), and
Centre O.R.S.T.O.M., B.P. 434, Tananarive (Madagascar), 10 November 1971.



Embryonic cells of Tenuipalpidae. A) diploid complement of *R. indica*. B) haploid complement of *R. indica*. C) diploid complement of *B. obovatus*.

[1] J. Gutierrez, W. Helle and H. R. Bolland, Acarologia *12*, 732 (1970).
[2] J. H. Oliver and B. C. Nelson, Nature, Lond. *214*, 809 (1967).