

8.3 REPRODUCTION AND CHROMOSOMES IN THE BROAD MITE, *POLYPHAGOTARSONEMUS LATUS* (BANKS, 1904) (Acari, Prostigmata, Tarsonemidae)

C. H. W. Flechtmann and C. A. H. Flechtmann†

INTRODUCTION

Karyotypic information on plant-feeding mites of the family Tarsonemidae is rather scarce, while a considerable amount of information has been published on those of the families Tetranychidae and Tenuipalpidae (Helle & Bolland 1967, Oliver 1977, Gutierrez *et al.* 1979, Helle *et al.* 1980).

Jeppson *et al.* (1975) report that in most species of the family Tarsonemidae unfertilized eggs produce only males, although individuals resulting from parthenogenetic reproduction in *Steneotarsonemus pallidus* are invariably females.

No reference to the karyotypes of tarsonemid mites were found in the literature. There are, however, two references to pyemotid mites, *Siteroptes graminum* (Reuter) $n = 3$, and *Pyemotes ventricosus* (Newport), both haplo-diploid (Patau 1936, Cooper 1937).

In the present paper the type of parthenogenesis and the karyotype of the broad mite, *Polyphagotarsonemus latus*, are reported.

MATERIAL AND METHODS

P. latus was collected from bean plants (*Phaseolus vulgaris* L. Fabaceae). Individual larvae were isolated on bean leaf discs kept over wet cotton, and their offspring were observed.

Eggs from fertilized and from nonfertilized females were squashed in 1% sodium citrate and stained with 1% aceto-orcein for chromosome counting.

RESULTS

- (1) Nonfertilized females laid 3 to 18 eggs (mean 7.8) and produced only male offspring.
- (2) The first male offspring fertilized its mother; this female then produced a larger quantity of eggs, resulting in males and females. In a few instances the male which fertilized its mother also fertilized one of the daughters.
- (3) Eggs 1 to 2 days old were most favourable for chromosome counting. Eggs from non-fertilized females had 2 chromosomes and eggs from fertilized ones 2 or 4 chromosomes.

DISCUSSION

- (1) In *P. latus*, males are haploid and are produced by arrhenotokous parthenogenesis. Females are diploid ($n = 2$; $2n = 4$).

†Dept. Zoology, University of Sao Paulo, ESALQ 13400 Piracicaba, Sao Paulo, Brazil.

- (2) This minimal chromosome number, rather common among the members of the family Tetranychidae (spider mites), has also been recorded in the Tenuipalpidae, Hydrachnellae, Pyemotidae, and Harpyrhynchidae.
- (3) A population of *P. latus* can develop from one single egg, provided it is a fertilized one. Alternatively, one larva, if female, may give rise to a new colony since mother–son mating can occur. In dispersal this species has the advantages of a hermaphrodite.
- (4) This seems to be the first cytological confirmation of haplo-diploidy in a tarsonemid mite.
- (5) These findings are of practical as well as fundamental importance. *P. latus* is an economically important plant-feeding mite. Although no resistance to chemicals has yet been reported, the species is continually being exposed to new products. If pesticide resistance develops, our data will be useful in its genetic analysis.
- (6) The haplo-diploidy and arrhenotoky in this mite of the family Tarsonemidae is in accordance with most of the Actinotrichida so far examined.

SUMMARY

Polyphagotarsonemus latus was found to be an arrhenotokous mite species with $n = 2$ chromosomes. Mother–son mating may occur, giving it the advantages of a hermaphrodite.

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