

# The chromosome number in tarsonemid and pyemotid mites (Acari: Heterostigmata: Tarsonemidae, Pyemotidae)

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BOLLAND, H. R. & W. Ł. MAGOWSKI, 1995. THE CHROMOSOME NUMBER IN TARSONEMID AND PYEMOTID MITES (ACARI: HETEROSTIGMATA: TARSONEMIDAE, PYEMOTIDAE). – *ENT. BER., AMST.* 55 (10): 166-167.

*Abstract:* The karyotypes of three *Tarsonemus*, two *Phytonemus* and one *Pyemotes* species were determined. In the tarsonemid species invariably the haploid number ( $n$ ) is 2 ( $2n = 4$ ) but for *Pyemotes* species the haploid number was 3 ( $2n = 6$ ).

*Key words:* Heterostigmata, chromosomes, karyotypes.

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## Introduction

There are very few papers on form and number of chromosomes in the families Tarsonemidae and Pyemotidae (Acari: Prostigmata). Helle et al. (1984) who studied *Tarsonemus* sp. (nr. *setifer* Ewing) and *Phytonemus pallidus* (Banks) and Flechtmann & Flechtmann (1984) who studied *Polyphagotarsonemus latus* (Banks), found the haploid chromosome numbers to equal 2. However in some other Heterostigmata, three chromosomes were found: in *Pyemotes ventricosus* (newport) (Pyemotidae) by Pätou (1936), and in *Siteroptes gramineum* (Reuter) (Pygmephoridae) by Cooper (1937). The chromosomes were acentric, holokinetic, grainlike or elongated (metaphasal) in all these cases.

In this paper we reassess the number of chromosomes for *Phytonemus pallidus*, and provide new data for another *Phytonemus* and *Tarsonemus* species, and a *Pyemotes* species.

## Materials and Methods

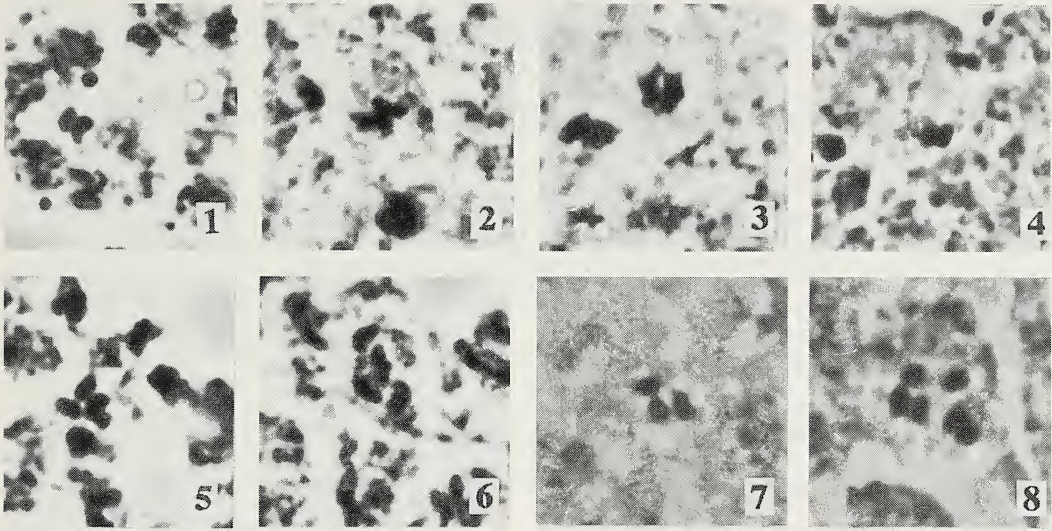
Karyotyping was performed according to a method described by Helle & Bolland (1967) involving observations on egg squashes in

which the chromosomes were stained with aceto-orceine. The most suitable egg stage for karyotyping was found to be the two days old, glossy-whitish stage, in cultures reared at 23 °C. Stained material was examined with a phase contrast microscope.

Mites of the genus *Tarsonemus* (Tarsonemidae) were collected at Anna's Hoeve, the campus of the Faculty of Biology of the University of Amsterdam, and reared on undetermined fungi grown on malt agar in Petri-dishes. *Phytonemus* strains (Tarsonemidae) were collected from greenhouse cultures of *Cyclamen* sp. (Aalsmeer) and *Fragaria* sp. (Ammerzoden). A culture of these species was established starting from single females kept on detached leaves of the same host plant as where they were collected from.

Species identity was checked at least twice per generation. All cultures were kept in climate rooms at 23 °C, 75% relative humidity and 8/16 day length regime.

Live specimens of *Pyemotes tritici* (La Grèze-Fossot & Montagné) were provided by the late Dr Marek Kaliszewski during the International Course of Acarology in Ohio in 1989. He reared the mites on small sponges and fed them with pulverized dogfood.



Figs. 1-8. Photomicrographs of egg squashes of various species of Tarsonemidae and Pyemotidae. 1, *Phytonemus pallidus*,  $n = 2$ ; 2, *Phytonemus fragariae*,  $n = 2$ ; 3, *Tarsonemus confusus*,  $n = 2$ ; 4, *Tarsonemus hermes*,  $n = 2$ ; 5, *Tarsonemus hermes*,  $2n = 4$ ; 6, *Tarsonemus nodosus*,  $2n = 4$ ; 7, *Pyemotes tritici*,  $n = 3$ ; 8, *Pyemotes tritici*,  $2n = 6$ .

## Results and Discussion

The tarsonemid specimens investigated belonged to the following species: *Tarsonemus confusus* Ewing, *T. hermes* Suski, *T. nodosus* Schaarschmidt, *Phytonemus pallidus* and *P. fragariae* Zimmermann; the last two species are morphologically very similar.

For all these species the number of metaphase chromosomes was  $n = 2$  (haploid) and  $2n = 4$  (diploid), but for *Pyemotes tritici* the chromosome number was  $n = 3$  and  $2n = 6$ . There was little variability in shape and structure of the chromosomes. In the mitotic metaphase stage they were grainlike or slightly elongate, and apparently holocentric. Their sizes ranged from 10 to 15  $\mu\text{m}$ . Microphotographs of examined material are shown in figures 1-8.

In conclusion, the number of chromosomes observed in the Tarsonemidae appeared invariably equal to ( $2n = 4$ ). Moreover, morphologically similar, but biologically different forms of *P. pallidus* and *P. fragariae* cannot be distinguished based on chromosome numbers.

## Acknowledgements

We express our sincere gratitude to Dr J. Fransen (Research Station for Horticulture, Aalsmeer) and Mr H.

van Hemmert (Ammerzoden) for supplying specimens of *Phytonemus* and Dr M. Kaliszewski for supplying specimens of *Pyemotes tritici*, and to Dr M. W. Sabelis for suggestions and comments on a previous version of the manuscript.

The stay in The Netherlands of the second author was financially supported by the Netherlands Organization for International Cooperation in Higher Education (NUFFIC).

## References

- COOPER, K. W., 1937. Reproductive behavior and haploid parthenogenesis in the grass mite, *Pediculopsis graminum* (Reut.) (Acarina, Tarsonemidae). – *Proc. Nat. Acad. Sci.* 23: 41-44.
- FLECHTMANN, C. H. W. & C. A. H. FLECHTMANN, 1984. Reproduction and chromosomes in the broad mite *Polyphagotarsonemus latus* (Banks, 1904) (Acari: Prostigmata: Tarsonemidae). In: *Acarology VI*. (D. A. Griffiths & G. E. Bowman, eds): Vol. 1: 455-456. Ellis Horwood, Chichester.
- HELLE, W. & H. R. BOLLAND, 1967. Karyotypes and sex-determination in spider mites (Tetranychidae). – *Genetica* 38: 43-53.
- HELLE, W., H. R. BOLLAND, S. H. M. JEURISSEN & G. A. VAN SEVENTER, 1984. Chromosome data on the Actinedida, Tarsonemida and Oribatida. In: *Acarology VI* (D. A. Griffiths & G. E. Bowman, eds): Vol. 1: 449-454. Ellis Horwood, Chichester.
- PÄTAU, K., 1936. Cytologische Untersuchungen an der haploid-parthenogenetischen Milbe *Pediculoides ventricosus*, Newp. Berl. – *Zool. Jahrb.* 56: 227-322 + 1.

Accepted 23.ii.1995