

## Differences in chromosome number between germ line and soma in the genus *Forda* (Homoptera: Aphididae)

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### Abstract

The chromosomes of embryos within thelytokous females of *Forda* spp. were studied, in samples from galls on *Pistacia* in the Middle East, and from roots of Poaceae in the Middle East, Europe and North America. The nuclei of oogonial cells, oocytes and early cleavage stages have consistently more chromosomes than the nuclei of dividing cells in the somatic tissues of young embryos from the same mothers. Elimination of the extra germ line chromosomes apparently occurs in late cleavage. In *F. marginata* Koch the germ line chromosome number varies from 25 to 40 in different populations and the somatic cell number varies from 17 to 20; in *F. formicaria* the germ line has 21–23 chromosomes and somatic nuclei have 18 or 20. In both species variation occurs between samples from galls on *Pistacia* as well as between populations on roots of Poaceae. The numbers and relative sizes of the eliminated chromosomes also differ between populations. Comparable phenomena in other insects are briefly discussed.

### Introduction

The pemphigine aphids *Forda marginata* Koch and *F. formicaria* von Heyden have a biennial sexual phase on their primary host, *Pistacia* spp. in the Mediterranean area and Middle East, but maintain themselves solely by thelytokous parthenogenesis on the roots of the secondary host plants, Poaceae, in North and Central Europe and North America. Robinson and Chen (1969) recorded  $2n = 28$  and  $2n = 20$  as the chromosome numbers of *F. marginata* and *F. formicaria* respectively in Canada, and illustrated the karyotypes with idiograms. Blackman (1980) noted that cells with two different chromosome numbers could be found within single embryos of both species, and suggested that this might be due to differences between the germ line and the soma, as in certain Diptera. However, the situation was confused because only anholocyclic (permanently thelytokous) populations in North America and Northern Europe had been sampled, and these showed considerably karyotype variation between

samples and marked structural heterozygosity, as is frequently the case in anholocyclic aphids.

Several samples of both species collected from *Pistacia* have now been karyotyped. The aphids were collected from galls containing colonies started by fundatrices which hatched from sexually-produced eggs. It has still not been possible to study meiosis, as this occurs at a difficult stage in Pemphiginae, when the sexual morphs of the aphid are still embryos within their immature parents (sexuparae) on the roots of the secondary host plants. However, clear preparations of oogonia cells, parthenogenetic oocytes and early embryonic stages have now been obtained, so that it is possible to report on the differences between germ line and soma and discuss further the karyotype variation in these aphids.

### Material and methods

Field collected aphids were preserved in 3 parts methanol: 1 part glacial acetic acid. Collection data

