



## Cytogenetics of Two Species of *Euceraphis* (Homoptera, Aphididae)

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**Abstract.** Somatic cell divisions, spermatogenesis, and the prophase stages of primary oocytes, are described for two species of birch aphid, *Euceraphis betulae* (Koch) and *E. punctipennis* (Zetterstedt). Females of *E. betulae* have two autosome pairs, two pairs of X-chromosomes of different lengths, and two B-chromosomes. Females of *E. punctipennis* have the same number of X-chromosomes and B-chromosomes as *E. betulae*, but only a single pair of autosomes. The sex determination system is  $X_1X_20$ . *E. punctipennis* males sometimes have only one B-chromosome. In the spermatogenesis of *E. betulae*, pairing of homologous autosomes occurs in early prophase I, but no evidence was found of chiasmata or end-to-end alignment of homologues. Instead, homologues remain closely aligned in parallel as they condense into metaphase, and anaphase I separates the products of pairing in a strictly reductional manner. The two unpaired X-chromosomes and both B-chromosomes are stretched on the anaphase I spindle and all four pass into the larger secondary spermatocyte. The second division is equational. The B-chromosomes thus show accumulation in spermatogenesis, which must be compensated in some way by an elimination mechanism in oogenesis. Meiosis of *E. punctipennis* is highly anomalous. The two autosomes pair but separate again in early prophase I, then one homologue becomes heterochromatic and is apparently rejected from the late prophase nucleus. A single, equational maturation division follows. In female meiosis I, both species show highly characteristic diplotene figures with multiple chiasmata, the B-chromosomes remaining unpaired. These results are discussed in relation to previous work on aphid cytogenetics.

### Introduction

*Euceraphis* are common aphids associated with birch trees (*Betula* species). Shinji (1927, 1931) was first to study a member of this genus cytologically, and reported a multiple sex chromosome system which appears to be unique

