

10 Cytology and Cytogenetics

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With a discussion of the inheritance of X chromosomes

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Chromosome cytology in the Cimicidae was first described by Slack (1938); shortly thereafter Darlington (1939) discussed the unique aspects of chromosome behavior in *Cimex columbarius* and *C. lectularius*. Further work with bed bug chromosomes has not been reported until quite recently. Ueshima (1963a) and Ryckman and Ueshima (1964) studied the *Cimex pilosellus* complex and the genus *Hesperocimex* and found a remarkable diversity of chromosome complements and development of supernumerary sex chromosomes. In the *Cimex pilosellus* complex, characteristics of the meiotic sequence were clearly demonstrated by the behavior of heteromorphic bivalents and trivalents in hybrids (Ueshima 1963a).

The Cimicidae, like most Hemiptera, have holokinetic chromosomes, i.e., chromosomes with diffuse kinetic activity having unique cytological features distinguishing them from those with kinetic activity localized in a single centromere. There is thus no centromere for aid in identifying mitotic chromosomes; in spermatogonial divisions in bed bugs, the chromosomes increase gradually in size, and all are similar in shape. Chromosome fragments maintain kinetic activity and may undergo normal maneuvers during division (Schrader 1947). In several distinct examples of holokinetic chromosomes the meiotic sequence is inverted. In the bed bug, the autosomes show typical behavior—they co-orient and separate reductionally at first anaphase, but the sex chromosomes auto-orient and separate equationally at the first metaphase and do not undergo reduction until the second division (Ueshima 1963a). Another unique feature is that sex chromosomes undergo "touch and go" pairing at the second division.

In all the species described, testes and ovaries were fixed in Carnoy or in an isopropyl-Carnoy solution (Ueshima 1963b). Most observations were made with fresh acetocarmine squashes, but some preparations were made by sectioning and staining with Feulgen. A camera lucida was used