

left of the picture contains the 100 base pair ladder for comparison. The first, second and fourth fragment are the largest ones (about 800-900 nucleotide base pair length), while the third and fifth fragments are of intermediate size (about 400 to 600 bp). The sizes of these fragments are within the limit of such fragments used for population genetics studies (Das *et al.*, 2004). However, detail sequencing of all these five fragments and further detection of single nucleotide polymorphisms (SNPs) through comparison of about 10 individuals with DNA sequence assembly and alignments will further confirm their utilization in population genetic analyses. This preliminary work is currently under process in our laboratory.

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Endemic inversions in Brazilian populations of *Drosophila melanogaster*.

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Introduction

Drosophila melanogaster is a cosmopolitan species with a very large area of distribution (Keller, 2007). It is natural that, exploiting a wide range of climatic conditions, *D. melanogaster* exhibits a large variability in morphologic and genetic characters. One such character is chromosomal inversion polymorphism (Krimbas and Powell, 1992; Lemeunier and Aulard, 1992; Powell, 1997). *D. melanogaster* chromosomal inversions can be categorized as cosmopolitan (common and rare) and endemic (recurrent and unique), depending on the geographical distribution and frequency (Mettler *et al.*, 1977). Cosmopolitan inversions are those that have been observed in populations from all parts of species' geographical range. Endemic inversions are geographically restricted. Recurrent endemic inversions are observed more than once in a given population or may be observed in adjacent populations, while unique endemic inversions are observed only in a single individual from a single population (Mettler *et al.*, 1977). Inoue and Igarashi (1994) also described recurrent inversions as 'polymorphic endemics'. Comparisons of the endemic inversions found by

different researchers are sometimes very hard due to the absence of microphotographs. Here we report and document endemic inversions found in Brazilian populations of *D. melanogaster*.

Materials and Methods

Adult flies were collected in urban and suburban areas using traps containing fermented banana baits. We examined samples of *n* individuals from the following locations: Fortaleza, CE (2005; *n* = 21); Recife, PE (2004, 2005; *n* = 178); Porto Seguro, BA (2006; *n* = 18); Rio de Janeiro, RJ (2004, 2005; *n* = 180); Campinas, SP (2004, 2006; *n* = 131); Florianópolis, SC (2006; *n* = 21); Santa Maria, RS (2006; *n* = 25); Porto Alegre, RS (2006; *n* = 45).

Males collected from the wild were individually crossed to virgin *Canton-S* females, and male genotypes were determined by examining the salivary gland chromosomes of the F1 larvae. Polytene chromosomes were prepared by 1N HCl treatment and subsequent lacto-acetic-orcein staining of salivary gland cells from 3rd instar larvae (Ashburner, 1989, p 31). Slides were examined using a Nikon Eclipse E800 microscope with 100× objective magnification. Photomicrographs were captured using the digital camera Cool SNAP-Pro (Color). Then, they were digitized with the software Image Pro-Plus v. 4.1., and finally edited using Adobe Photoshop (Adobe 2002 7.0, v 701, San Jose, California, Adobe Systems Inc).

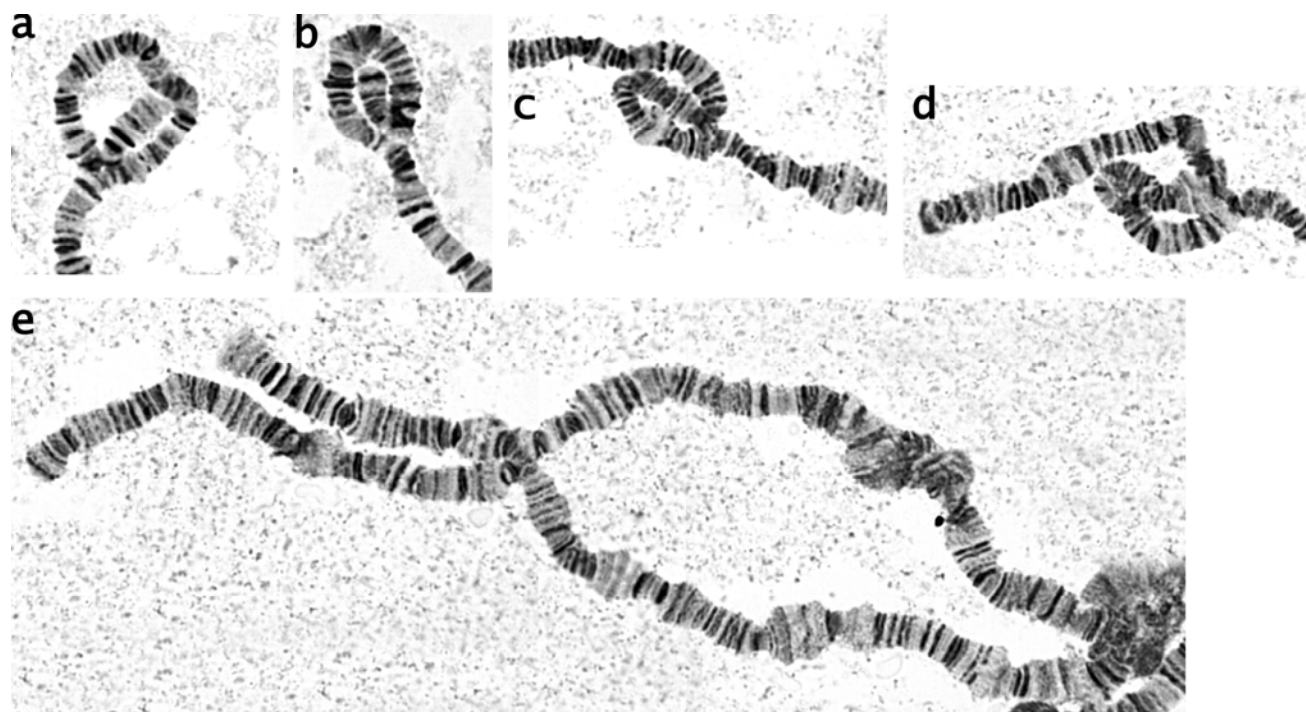


Figure 1. Endemic inversions found in Brazilian populations of *D. melanogaster*, chromosome 2: **a** – *In*(2L) 22A;28B ; **b** – *In*(2R)56D;60C; **c** – *In*(2R)49D;52F; **d** – *In*(2R)50AB;55E + *In*(2R)51D;52F; **e** – *In*(2LR)26A;52F.

Results

Endemic rearrangements identified in Brazilian populations of *D. melanogaster* (number of individuals found with inversion):

Chromosome 2:

- 1) *In(2L)22A;28B*, Figure 1-a, unique endemic: Rio de Janeiro, RJ, 2004. (1)
- 2) *In(2LR)26A;52F*, Figure 1-e, pericentric inversion, unique endemic: Campinas, 2004 (1).
- 3) *In(2R)42A;52F*, Figure 2-c, unique endemic: found in two flies from Rio de Janeiro, RJ, 2004. (2)
- 4) *In(2R)42C;57E*, Figure 2- b, recurrent endemic: Recife, PE, 2002, 2004; Rio de Janeiro, RJ, 2004. (4)
- 5) *In(2R)42C;56E*, Figure 2- a, unique endemic: found in three flies from Porto Alegre, RS, 2005. (3)
- 6) *In(2R)44E;47E*, Figure 2-h, unique endemic: Campinas, SP, 2006. (1)
- 7) *In(2R)44DE;48F*, Figure 2-e, recurrent endemic: Campinas, SP, 2005, Florianópolis, SC, 2006. (3)
- 8) *In(2R)45F;59B + In(2R)51E;57A*, Figure 2-j, unique endemic: Rio de Janeiro, RJ, 2004. (4)
- 9) *In(2R)46F-47A;59B*, Figure 2-f, unique endemic: found in three flies from Campinas, SP, 2004. (3)
- 10) *In(2R)47B;51C*, unique endemic: Florianópolis, SC, 2006. (1)
- 11) *In(2R)47E;51F-52A*, Figure 2-k, unique endemic: Rio de Janeiro, RJ, 2004. (1)
- 12) *In(2R)47F;50E*, Figure 2-d, unique endemic: Campinas, SP, 2006. (1)
- 13) *In(2R)49E;53F*, Figure 2-i, unique endemic: Santa Maria, RS, 2006. (2)
- 14) *In(2R)49D;52F*, Figure 1-c, unique endemic: Florianópolis, SC, 2006. (1)
- 15) *In(2R)50A;55E*, Figure 2-l, recurrent endemic: Campinas, SP, 2004, 2005. (4)
- 16) *In(2R)50AB;55E + In(2R)51D;52F*, Figure 1-d, recurrent endemic: Campinas, SP, 2004, 2006. (2)
- 17) *In(2R)51A;55E*, recurrent endemic: Rio de Janeiro, RJ, 2004; Campinas, SP, 2004. (2)
- 18) *In(2R)51B;59B*, Figure 2-g, unique endemic: Campinas, SP, 2005. (1)
- 19) *In(2R)53EF;55C*, unique endemic: Rio de Janeiro, RJ, 2004. (1)
- 20) *In(2R)55DE;59A*, unique endemic: Rio de Janeiro, RJ, 2004. (1)
- 21) *In(2R)56D;60C*, Figure 1-b, recurrent endemic: Rio de Janeiro, RJ, 2004, 2005. (3)

Chromosome 3

- 1) *In(3L)63F;64A*, unique endemic: Campinas, SP, 2004. (1)
- 2) *In(3L)64A;66B*, Figure 3-a, recurrent endemic: Recife, PE, 2004, 2005; Rio de Janeiro, RJ, 2004, 2005; Campinas, SP, 2004, 2005, 2006. (20)
- 3) *In(3L)64A;67B*, Figure 3-b, recurrent endemic: Rio de Janeiro, RJ, 2004, 2005; Campinas, SP, 2004, 2005, 2006. (22)
- 4) *In(3L)65DE;67C*, Figure 3-c, unique endemic: Rio de Janeiro, RJ, 2004. (1)
- 5) *In(3L)66D;72EF*, unique endemic: Campinas, SP, 2005. (1)
- 6) *In(3L)67A;71B*, Figure 3-h, recurrent endemic: Fortaleza, CE, 2005; Rio de Janeiro, RJ, 2004, 2005; Campinas, SP, 2005. (8)
- 7) *In(3L)67B;69E*, Figure 3-d, recurrent endemic: Rio de Janeiro, RJ, 2004; Campinas, SP, 2004, 2005; Florianópolis, SC, 2006. (7)

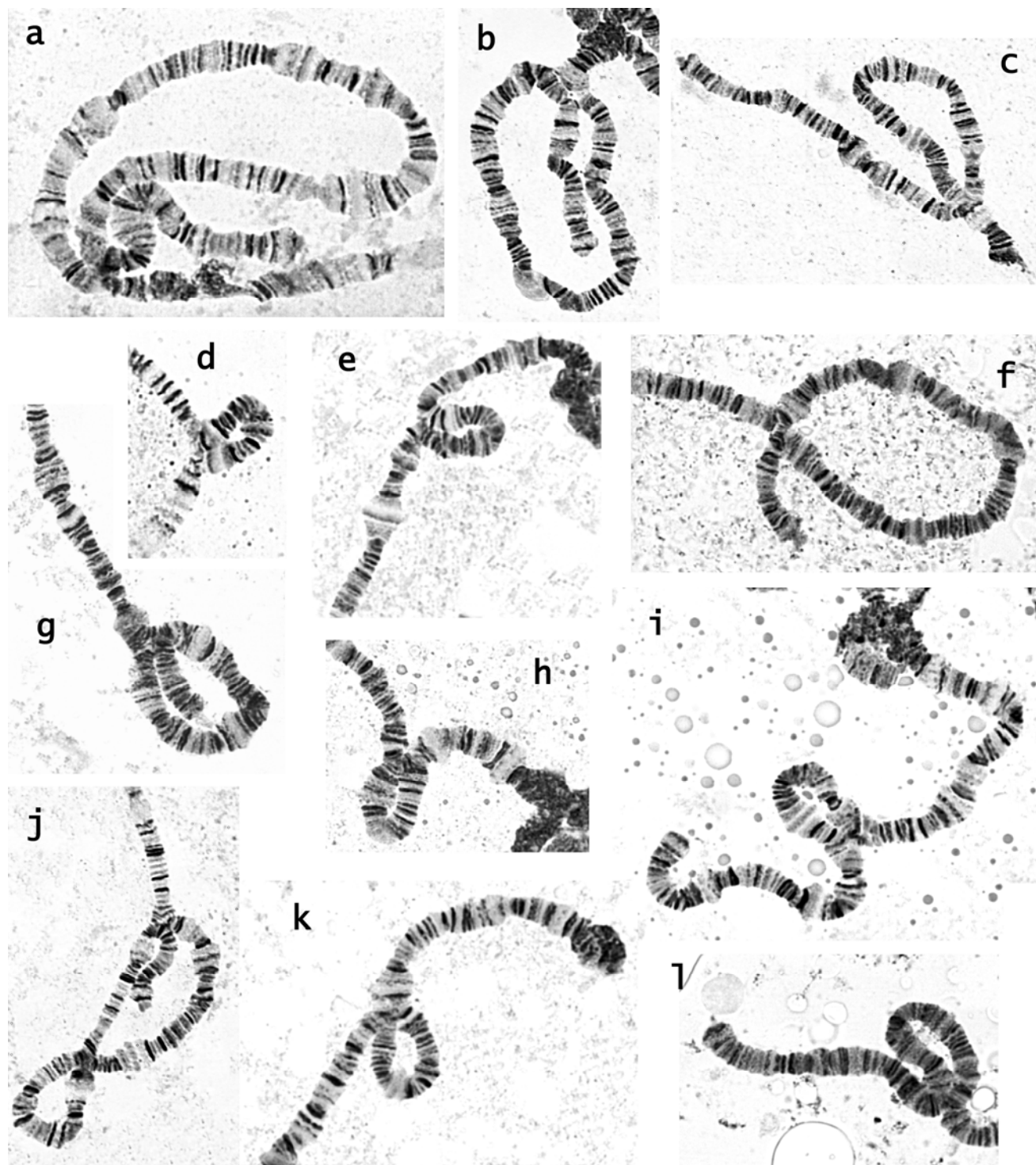


Figure 2. Endemic inversions found in Brazilian populations of *D. melanogaster*, chromosome 2, 2R arm: **a** – *In*(2R)42C;56E; **b** – *In*(2R)42C;57E; **c** – *In*(2R)42A;52F; **d** – *In*(2R)47F;50E, **e** – *In*(2R)44DE;48F; **f** – *In*(2R)46F-47A;59B; **g** – *In*(2R)51B;59B; **h** – *In*(2R)44E;47E; **i** – *In*(2R)49E;53F; **j** – *In*(2R)45F;59B + *In*(2R)51E;57A; **k** – *In*(2R)47E;51F-52A; **l** – *In*(2R)50A;55E.

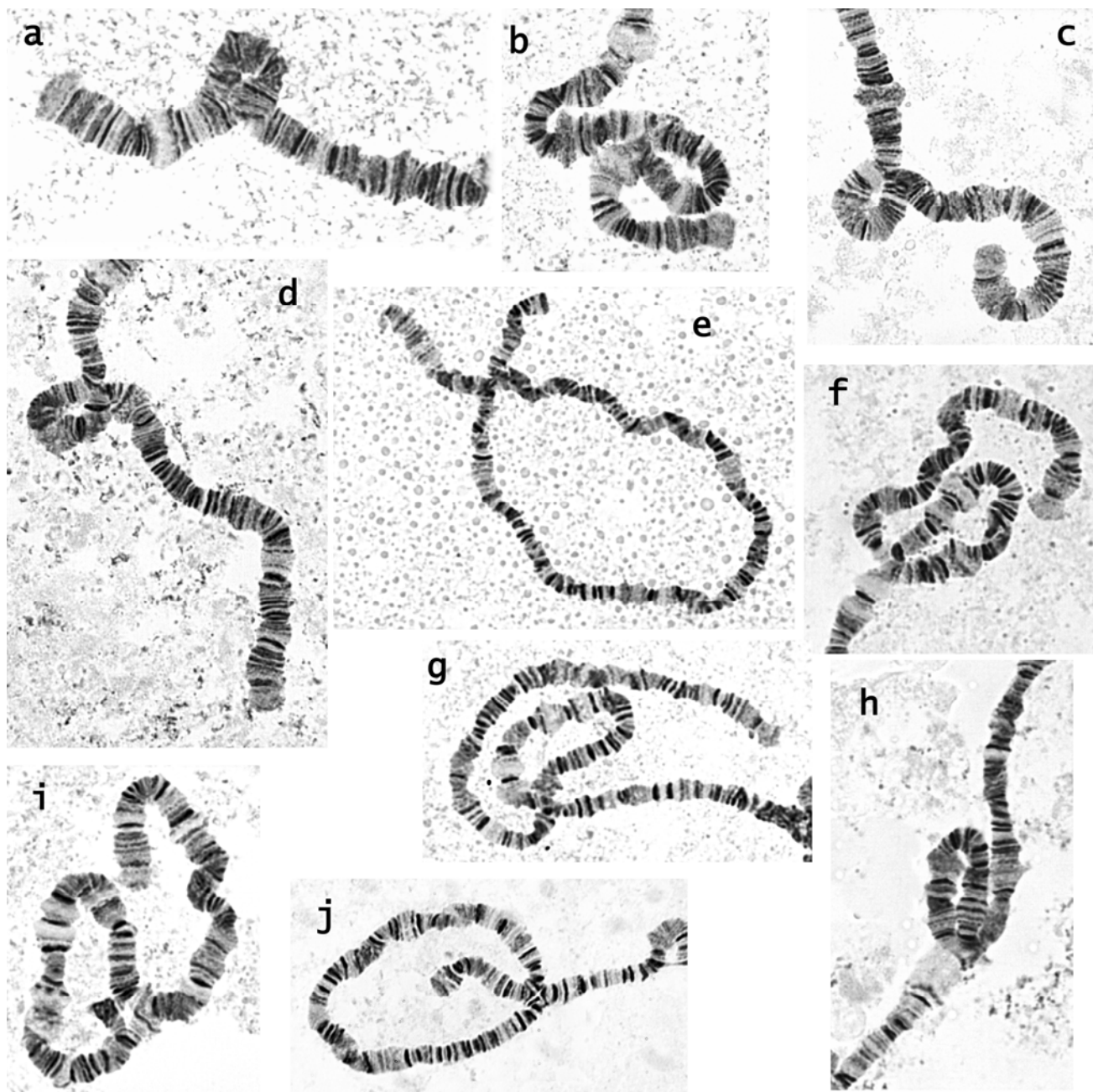


Figure 3. Endemic inversions found in Brazilian populations of *D. melanogaster*, chromosome 3: **a** – *In(3L)64A;66B*; **b** – *In(3L)64A;67B*; **c** – *In(3L)65DE;67C*; **d** – *In(3L)67B;69E*; **e** – *In(3R)84D;98F*; **f** – *In(3L)67B;74C*; **g** – *In(3L)68F;75C*; **h** – *In(3L)67A;71B*; **i** – *In(3L)68CD;79F*; **j** – *In(3R)87E;98C*.

- 8) *In(3L)67B;74C*, Figure 3-f, unique endemic: Florianópolis, SC, 2006. (1)
- 9) *In(3L)68CD;79F*, Figure 3-i, recurrent endemic: Recife, PE, 2002, 2005; Porto Seguro, BA, 2006; Rio de Janeiro, RJ, 2004, 2005; Campinas, SP, 2004, 2005, 2006; Florianópolis, SC, 2006. (19)
- 10) *In(3L)68F;75C*, Figure 3-g, recurrent endemic: Rio de Janeiro, RJ, 2004; Campinas, SP, 2004, 2005. (7)

- 11) *In(3L)68F;70C*, unique endemic: Rio de Janeiro, RJ, 2004. (1)
- 12) *In(3R)84D;98F*, Figure 3-e, unique endemic: Rio de Janeiro, RJ, 2005. (1)
- 13) *In(3R)87F;92F*, recurrent endemic: Rio de Janeiro, RJ, 2004; Florianópolis, SC, 2006. (2)
- 14) *In(3R)87E;98C*, Figure 3-j, recurrent endemic: Rio de Janeiro, RJ, 2004; Campinas, SP, 2004. (4)

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Hearing defects in Johnston's Organ Gal4 lines.

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Introduction

The *Drosophila* auditory organ, Johnston's Organ (JO), is housed in the second antennal segment (a2; Caldwell and Eberl, 2002). It consists of an array of more than 200 mechanosensory chordotonal organs termed scolopidia. Each scolopidium contains two to three bipolar neurons, and a number of support cells including the scolopale cell which ensheaths the ciliated dendritic processes of the neurons. The basal ends of the scolopidia are attached to the inner surface of a2, while the apical ends are attached to the joint between the a2 and a3 segments by a dendritic cap that is secreted by the scolopale cell and possibly other support cells. The vibrating air particles of a near-field sound, typically the flies' courtship song, cause deflection of the arista and rotation of the third antennal segment (a3) about the a2/a3 joint. This stretches the entire array of scolopidia, initiating transmission of a signal to the central brain via the antennal nerve.

A number of Gal4 lines that label specific subsets of neurons within the JO have been identified (Sharma *et al.*, 2002; Kamikouchi *et al.*, 2006). The JO1 line labels most neurons in the JO (94%), while the JO3 line labels 67% of JO neurons. Three other lines label 22-38% of the JO neurons (JO2, JO4, JO15). An additional twelve lines label JO neurons as well as other cells within the antenna and forehead region (JO21-JO32). All of the lines also label cells elsewhere in the fly brain, except JO15, which expresses Gal4 only in the JO (Sharma *et al.*, 2002). The JO15 line expresses Gal4 under control of a JO specific enhancer fragment, originally identified and cloned from a *hobo* enhancer trap line that specifically stains the JO neurons (Sharma *et al.*, 2002).

The spatial organization of the JO neurons expressing Gal4 in each line has been determined, as well as their projection patterns to the antennal mechanosensory and motor center, the AMMC (Kamikouchi *et al.*, 2006). Within the JO, the cell bodies of the JO neurons form a bottomless bowl shape. The JO3 line labels cells throughout the entire bowl region, while the JO2 line labels a middle