The ability to estimate relative contraction strengths at different positions along the embryo also allowed us to generate average contraction strength profiles. We separated backward waves from forward waves in 10 embryos and averaged their peak intensities at each position along the embryo. We found that in wild type embryos, contraction waves decrease in strength on average as they progress. Thus in forward waves the highest intensity is typically at the posterior end, while in backward waves the highest intensity is most frequently at the anterior (Figure 3).

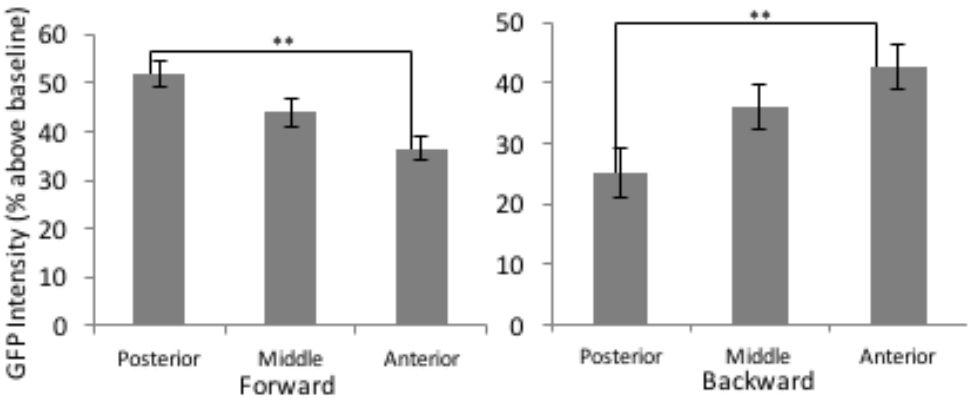

Figure 3. Average GFP intensity at posterior, middle, and anterior positions for forward (left panel) and backward (right panel) waves. In both wave types, contraction is stronger at the point of initiation than at the end point. Ten embryos were analyzed, yielding a total of 50 forward contractions and 24 backward contractions. Comparison of posterior and anterior intensities by ANOVA analysis yielded p-values of less than 0.01 for both wave types.

Here we have shown that the use of a simple fluorophore transgenically expressed in the muscles of *Drosophila* embryos allows for a quantitative estimate of relative contraction strength within embryos. This technique can be used to examine relative strengths at various points within a given contraction and to generate average contraction profiles. Embryonic contraction waves are an important part of *Drosophila* development and are often affected by mutations, particularly those related to neurological disorders that could disrupt contraction coordination. Therefore the technique described here may be important in characterizing the phenotypes of *Drosophila* mutants by comparing their profiles to that of wild type, and may also help elucidate cellular and molecular mechanisms underlying these phenotypes.

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Drosophilidae (Diptera) attracted to fallen fruits of *cajá-manga* (*Spondias dulcis* Parkinson; Anacardiaceae) in the western region of the city of São Paulo, state of São Paulo, Brazil.

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Spondias dulcis Parkinson (The Plant List 2015), vernacularly known as *cajá-manga* or *cajarana* in Brazil and as Polynesian plum, hog plum, ambarella, and many other names in other countries (Pio Corrêa,

1984), is a tropical tree native to the pacific archipelago of Polynesia (Society Islands) and introduced by human beings in most of the tropical countries around the world. The tree can reach up to 18 m high and is a deciduous plant that loses all its leaves soon after they have turned beautifully golden yellowish (Lorenzi *et al.*, 2006) in the late autumn season (May-June) producing hundreds of edible fruits which ripen during the late winter season (August) of southern hemisphere.

Table 1. Species (alphabetically ordered) richness and abundance of Drosophilidae sampled at the didactic garden of the *Departamento de Botânica* of the IB-USP, *Cidade Universitária "Armando de Salles Oliveira"*, São Paulo, SP, Brazil, by sweeping net over fallen, decaying fruits of *cajá-manga* (*Spondias dulcis* Parkinson; Anacardiaceae); C.R. Vilela *coll.* 5-6.VIII.2015 (coded M62).

Species	males	females	Total
Drosophila cardinoides Dobzhansky and Pavan, 1943	0	1	1
Drosophila griseolineata Duda, 1927	9	3	12
Drosophila hydei Sturtevant, 1921	2	9	11
Drosophila immigrans Sturtevant, 1921	41	33	74
Drosophila kikkawai Burla, 1954	0	2	2
Drosophila maculifrons Duda, 1927	1	1	2
Drosophila malerkotliana Parshad and Paika, 1965	34	32	66
Drosophila mediopicta Frota-Pessoa, 1954	2	0	2
Drosophila melanogaster Meigen, 1830	1	1	2
Drosophila mercatorum Patterson and Wheeler, 1942	2	0	2
Drosophila nasuta Lamb, 1914	32	44	76
Drosophila nebulosa Sturtevant, 1916	1	1	2
Drosophila neocardini Streisinger, 1946	3	7	10
Drosophila pallidipennis Dobzhansky and Pavan, 1943	0	1	1
Drosophila paramediostriata Townsend and Wheeler, 1955	7	7	14
Drosophila paulistorum Dobzhanky and Pavan in Burla *et al.* 1949 + *D. willistoni* Sturtevant, 1916	114	105	219
Drosophila polymorpha Dobzhansky and Pavan, 1943	3	3	6
Drosophila simulans Sturtevant, 1919	82	80	162
Scaptodrosophila latifasciaeformis Duda, 1940	6	2	8
Zaprionus indianus Gupta, 1970	31	18	49
Total	371	350	721

On August 5-6, 2015, while looking for female specimens of *Drosophila kikkawai* aiming to obtain isofemale lines requested by a colleague, I sampled flies by sweeping net over dozens of fallen fruits of *Spondias dulcis*, in different stages of rotting, resting on the ground among low vegetation under two tall adjacent *cajá-manga* trees. The collection site (coded M62)(23°33'54"S, 46°43'52"W; 782 m), was the didactic garden of the *Departamento de Botânica* of the *Instituto de Biociências* (Kraus *et al.*, 1994, p. 10, map I-61), located at the main campus of the *Universidade de São Paulo*, known as *Cidade Universitária "Armando de Salles Oliveira"*, west region of the city of São Paulo, state of São Paulo, Brazil, adjacent to one of the collection sites of Vilela and Goñi (2015) (compost pile coded M60).

The 721 (371 males: 350 females) collected Drosophilidae were identified as belonging to 21 species, 19 of them in the genus *Drosophila*, one in the genus *Scaptodrosophila*, and one in the genus *Zaprionus* (Table 1). Species identifications were based on the papers by Freire-Maia and Pavan (1949), Burla (1954), Frota-Pessoa (1954), Bock and Wheeler (1972), Vilela (1983), Vilela and Bächli (1990), Vilela (1999), Vilela *et al.* (2002), and Vilela and Goñi (2015). No attempts were made to identify other Diptera families. All collected Diptera (coded M62) will be deposited at the *Museu de Zoologia*, *Universidade de São Paulo*. As expected in

highly urbanized areas, nine (43%) of the 21 species of Drosophilidae and 450 (62%) of the 721 sampled specimens are represented by invasive species. The nine invasive species, in decreasing order of abundance, are as follows: *Drosophila simulans*, *D. nasuta*, *D. immigrans*, *D. malerkotliana*, *Zaprionus indianus*, *D. hydei*, *Scaptodrosophila latifasciaeformis*, *D. kikkawai*, and *D. melanogaster*. The capture of 76 (32 males: 44 females) specimens belonging to *Drosophila nasuta*, an invasive species registered for the first time in the Americas five months earlier, in March 2015 (Vilela and Goñi 2015), is suggestive that it has become established in the surveyed area. It was the second most abundant invader, surpassed only by *D. simulans*, with 162 sampled specimens.

Females of *Drosophila malerkotliana* and *Drosophila ananassae* Doleschall, 1858 are siblings and cannot be reliably separated from each other on morphological grounds. As not even a single male of *D. ananassae* was collected and 34 males of *D. malerkotliana* were sampled among a total of 721 captured drosophilids, it is assumed that the 32 of their females belonged to the latter species. Collections made indoors, mainly in kitchens, in the city of São Paulo (C.R. Vilela, unpublished data) have shown that *D. ananassae* is the second most abundant species only surpassed by *D. melanogaster*, the two species being considered strictly domestic, in the sense they are commonly found indoors, and very, very rarely collected outdoors. Similar condition can be observed in Table 1, regarding the sibling pair *D. simulans*/*D. melanogaster*, where 162 flies were identified as belonging to the first species and only two to the latter. Vilela and Goñi (2015) collected three males of *D. ananassae* from garbage cans in a place (coded M59) adjacent to the present surveyed area (coded M62), but it should be pointed out that although not stated by those authors the cans were standing in a shed behind the cafeteria, therefore partially indoors.

No attempts were made to individually identify *Drosophila willistoni* and *D. paulistorum*, a pair of sibling species, whose anesthetized males can be told apart by means of the analyses of their terminalia (genital chamber contour and the shape and size of hypandrium lobes), provided the aedeagus is not extruded (refer to Spassky, 1957, Figures. 11 and 13 for details); however, this is a very time-consuming process.

It should be pointed out that given the sampling method (swept nets), it is impossible to say with certainty that all the collected species and specimens were really attracted to the fallen, mostly decaying *cajá-manga* fruits, although it is likely they were. There always is a possibility that some of the sampled flies were just flying around, resting on the surrounding vegetation or other overlooked fermenting substrates.

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Richness of drosophilids in a naturally radioactive place in the Caatinga biome, northeast Brazil.

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