Interference (I) is defined as I = 1-coefficient of coincidence (c.o.c.), where the c.o.c. reflects the ratio of observed to expected double crossover frequencies. The expected frequency of double crossovers between two endpoints was calculated from the RF of individual regions. Any interval completely lacking double crossovers will have a c.o.c. equal to 0 and can, therefore, be characterized as having complete crossover interference (I = 1). Because we only observed double crossovers between intervals A and C, we present the calculation of interference for that pair only. All other closer windows (2 megabases or less) exhibited complete crossover interference.

Of the 1208 flies that we genotyped at all 5 markers in the first scan of backcross progeny, 230 were recombinant. This recombinant frequency of 0.19 yields an estimated probability of double crossovers of 0.036 and, with no interference, predicts 43.8 double crossovers between the two outermost markers, DPSX037N and DPSX021B1. However, we only observed two double crossovers in that region. Therefore, the c.o.c. = 0.046 and I = 0.954 for markers three megabases apart.

Overall, these results demonstrate fine-scale crossover rate variation along a 3-MB region of the XR chromosome arm, strong crossover interference in this region, and complete (or nearly complete) interference in closer windows. Many questions remain about the molecular mechanism underlying this phenomenon, and the strength of interference may well vary throughout the genome. If this is the case, a more thorough characterization of genomic interference patterns will strengthen the overall understanding of recombination.

Acknowledgments: We thank A. Somerville for technical assistance. Funding was provided by National Science Foundation grants 0509780 and 0715484, and National Institutes of Health grant GM076051.

References: Cirulli, E.T., R.M. Kliman, and M.A.F. Noor 2007, J. Mol. Evol. 64**:** 129-135; Gloor, G.B., and W.R. Engels 1992, Dros. Inf. Serv. 71**:** 148-149; Kulathinal, R.J., S.M. Bennett, C.L. Fitzpatrick, and M.A.F. Noor 2008, Proc. Natl. Acad. Sci. USA 105**:** 10051-10056; Ortiz-Barrientos, D., B.A. Counterman, and M.A.F. Noor 2004, PLoS Biol. 2**:** e416; Richards, S., Y. Liu, B.R. Bettencourt, P. Hradecky, S. Letovsky et al., 2005, Genome Res. 15: 1-18.

Sperm storage and nuptial gifts in *Drosophila paulistorum.*

Ehrman, Lee., and Richard Wrancher. Natural Sciences, State University of New York at Purchase College: lee.ehrman@purchase.edu and richard.wrancher@gmail.com

Theodosius Dobzhansky, doctoral mentor, and colleague for some three decades, used to speculate that sperm entering the two pigmented sophophoran spermathecae could not exist. The single ventral receptacle, he maintained in our routine Saturday morning chats, was the primary sperm storage organ. So perhaps spermathecal sperm were digested, constituting protein-rich nuptial gifts granted needy gravid females.

Many male insects donate nuptial gifts to help insure successful copulation and offspring, a form of paternal investment. While nuptial gifts come in various forms in arthropods, evolutionary origins are obscure. Gifts range from inanimate objects to balls of silk to sacrificing their own life, all to insure copulation with the females and the production of progeny. Greater numbers or masses of a nuptial gifts seem to correlate with greater numbers of offspring (…success for fruit flies, 2009).

He pointed out, correctly, that sperm entering transparent receptacles oriented themselves toward egg micropyles, while sperm entering spermathecal stalks clustered irregularly, resembling knotted hair. Doby specifically cited *D. prosaltans* spermathecae as possessors of funnel-like barriers at the distal tip of spermathecal stalks

Herewith we present a survey of this storage organ, present twice, transparent and light yellow in *D. paulistorum,* a neotropical *willistoni* group cluster of semispecies. (See Ehrman *et al.,* 1995, and Ehrman and Powell, 1982, for literature reviews.) Note especially the top part of the stalk inside the bulb constituting 'thecal storage areas.

We are reporting our observations here, hoping for assistance from those better informed: Do the spermathecal parts depicted here have formal entomologic names (unknown to us despite searches)? Is the Dobzhansky anecdote even partially true? Could moribund 'thecal sperm exist only when an ejaculate fully fills the ventral receptacles first? (See Figures 1, 2a, 2b, and 3.)

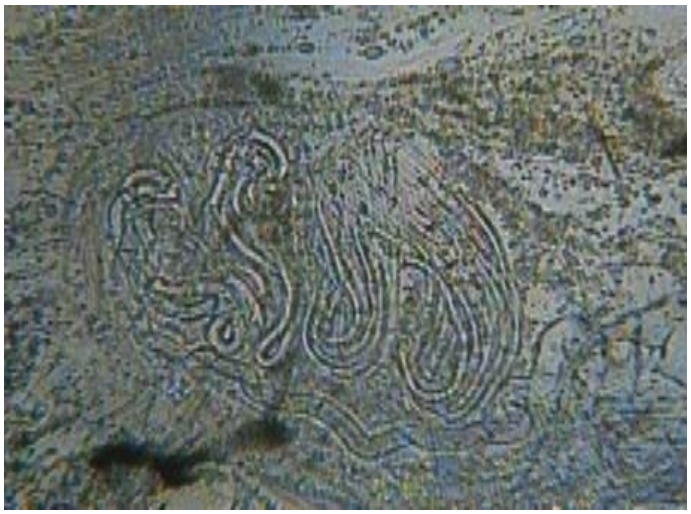

Figure 1. Ventral receptacle of *D. paulistorum* (unstained, 400×, in physiologic saline).

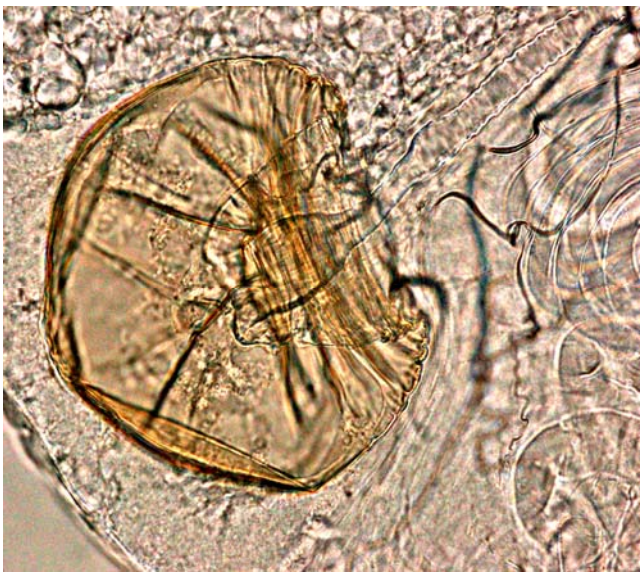

Figure 2a. Spermathecae of *D. paulistorum* (unstained, 400×, in physiologic saline). 2b. One spermatheca from an Amazonian female, 400×, with part of her ventral receptacle visible to the right. Note the centrally located funnel-like structure at the internal end of the spermathecal stalk

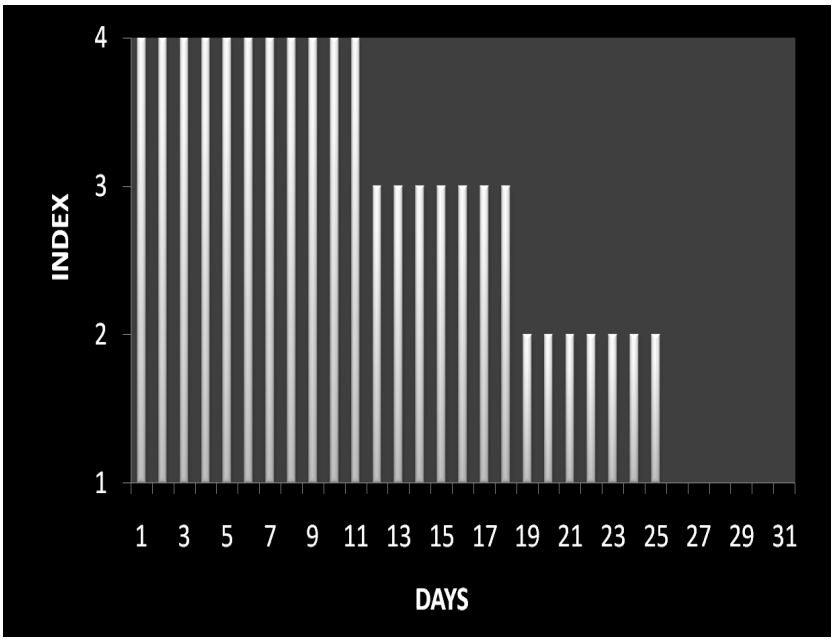

Figure 3. Exhaustion of *D. paulistorum* ventral receptacles over time (4 = full; 3 = half full; 2 = quarter full; 1 = empty).

Correlations scored between primary and secondary sperm storage sites proved inversely proportional. Females dissected after sperm exhaustion in the production of embryos, had no sperm in ventral receptacles, but sperm were present in spermathecae. Females dissected shortly after insemination had sperm in the ventral receptacle but no sperm in the spermathecae; however, as post mating time progressed, the spermathecae would contain sperm while the ventral receptacle was emptied in egg fertilization.

In the venerable 1947 (#4720) *University of Texas Publication: Studies in the Genetics of Drosophila V. Isolating Mechanisms,* M. Wheeler wrote of the *D. paulistorum* sibling species, *D. equinoxialis* (and *D. willistoni*, pp 84 and 85):

> These flies were then left together overnight and the females dissected early the following morning. Two inseminations were secured. In both specimens the ventral receptacle was teeming with sperm while the spermathecae contained only a few.

Professor Wolfgang Miller, Laboratory of Genome Dynamics, Medical University of Vienna, has recently stained *D. paulistorum* intersemispecific hybrid females (supplied by the Ehrman Purchase laboratory and checked for hybridity there) with DAPI (for DNA), plus fluorescent dye Alexa 488 (for *Wolbachia*), and found intense concentrations of this microorganism in all spermathecae. Could the *D. paulistorum* endosymbiotic *Wolbachia* be exploiting a reproductive storage organ as a "bacteriocyte"? If so this would constitute a newly evolved nutritional strategy, suggested by Dr. Miller who also notes that sperm stored in *D. paulistorum* spermathecae degenerate. We are certainly grateful to him for his ongoing insightful collaboration.

References: Ehrman, L., I. Perelle, and J.R. Factor 1995, Endosymbiotic Infectivity in *Drosophila paulistorum* Semispecies. *The Continuing Influence of Theodosius Dobzhansky.* Chap. 18: 241-261. New York: Columbia University; Ehrman, L., and J. Powell 1982, The *Drosophila willistoni* species group. In: *The Genetics and Biology of Biology of Drosophila.* (Ashburner, M., H.L. Carson, and J.N. Thompson, jr., eds.). Vol 3b, pp. 193-225. New York: Academic Press; Vomiting is path to romantic success for fruit flies. Retrieved March 5, 2009, from http://planetearth.nerc.ac.uk/news/story.aspx?id=344.