Table 2. Percentage species composition per bait type in Baja California collection, January 2001. Data presented by column.

Species		Banana	Agria	Cardon	Senita	Organ pipe
	Total baits	11	28	23	21	10
	Total flies	566	1055	1022	630	374
D. mojavensis		24.9%	33.6%	29.2%	4.9%	26.5%
D. aldrichi		6.5%	24.8%	19.7%	15.9%	35.0%
D. pachea		----	1.2%	2.5%	54.1%	8.3%
D. mettleri		7.2%	4.6%	16.0%	12.5%	11.0%
D. simulans		17.8%	21.0%	11.8%	3.5%	6.4%
D. nigrospiracula		0.7%	2.4%	7.8%	8.4%	5.9%
D. pseudoobscura		14.5%	4.5%	7.4%	0.3%	4.5%
D. arizonae		3.0%	1.2%	1.7%	0.2%	1.3%
D. hydei		4.9%	4.5%	1.0%	----	0.8%
D. busckii		13.3%	0.8%	----	0.2%	----
D. spenceri		2.8%	0.5%	2.0%	----	0.3%
D. repleta		1.1%	0.8%	----	----	----
D. eremophila		1.4%	----	----	----	----
D. azteca		1.2%	----	0.1%	----	----
D. mainlandi		----	----	0.6%	----	----
D. melanogaster		0.4%	----	0.2%	----	----
D. mathisi		0.2%	0.1%	----	----	----

References: Markow, T.A., and P.M. O'Grady 2006, Drosophila, *A Guide to Species Identification and Use*. Academic Press.

Drosophila carbonaria: **reproductive notes and a new recipe to rearing it in laboratory.**

Castrezana, Sergio. Drosophila Tucson Stock Center, University of Arizona, Tucson, AZ 85705, USA; E-mail: castreza@email.arizona.edu

Drosophila carbonaria Patterson and Wheeler 1942 is a single species in the carbonaria group (Sturtevant, 1942) within the subgenus *Drosophila*. This species is found in the Sonoran and Chihuahan Deserts of the Southwestern United States and Mexico. In nature, *D. carbonaria* are associated with the sap fluxes of mesquite trees (*Prosopis* spp.), and occasionally, windfall citrus fruits (Patterson, 1943). It is extremely rare to collect *D. carbonaria* on banana baits even when these baits were close to the mesquite trees (Pers. obs.). Recently, *D. carbonaria* has been introduced in the Hawaiian archipelago along with its host (Wagner, *et al*., 1990). Nevertheless, Hawaiian collections of *D. carbonaria* were associated to the sap fluxes of monkeypod trees *Samanea saman* (O'Grady, *et al.,* 2002).

Mesquite fluxes have the lowest nitrogen and phosphorus content of several described *Drosophila* host, including the cactus hosts of Sonoran desert *Drosophila* (Jaenike and Markow 2003). Thus, *D. carbonaria* likely has adopted specialized strategies to survive on its nutrient poor diet. Indeed, of 21 yeast species isolated from both mesquite and *D. carbonaria* flies, three of then were unique to this *Drosophila*-plant association (Ganter *et al.,* 1986). The paucity of research on the

reproductive ecology of *D. carbonaria*, coupled with its unique host environment, has made it difficult to adapt this species to laboratory culture in the past.

Patterson (1943) indicated that *D. carbonaria* does not breed well on laboratory medium unless the food is rather soft. I used wild-caught *D. carbonaria* females and their F1-F3 progeny to examine this result empirically. *Drosophila carbonaria* individuals were collected in Wetmore Park at Tucson, Arizona (32.28°N, 110.97°W) and set in 3-liter jars containing mesquite sap flux for three days. A female was then aspirated into a vial with one of three types of softened laboratory culture media: cornmeal, banana/opuntia, or Wheeler-Clayton food (recipes available at http://stockcenter.arl.arizona.edu). At least four ovipositing females were used for each laboratory culture medium. After 24 hours, the female was removed and the number of eggs was counted. Following larval development, pupal cases and eclosed adults were also quantified. F1 individuals were sorted as virgins and matured for ten days in vials containing the same culture media as their larval environment. F1 *D. carbonaria* pairs were then aspirated into vials with softened laboratory culture media and left in the vial for 24 hours. The pair was then removed and eggs, pupae and adults were counted. This procedure was repeated for F2 and F3 *D. carbonaria* individuals.

Results are presented in Table 1. For all media, almost 90% of *D. carbonaria* hatching larvae died before they reached the pupal stage. Furthermore, after three generations in these laboratory food media, all strains of *D. carbonaria* perished. There was some variation, however, in productivity of *D. carbonaria* on different media. Laboratory cornmeal medium was the most sustainable food type compared with Wheeler & Clayton or Banana/opuntia foods.

Table 1. Testing three different laboratory culture media for *Drosophila carbonaria*: Average number of eggs oviposited in 24 hours, total number of larvae reaching pupae stage, and total adults emerging.

	Wheeler & Clayton				Cornmeal				Banana/Opuntia			
	N	eggs	pupae	adults	N	eggs	pupae	adults	N	eggs	pupae	adults
Wild-♀	4	23.3±3.8	1.0±0.4	0.8±0.4	4	45.3±5.5	5.3±1.0	4.3±0.5	4	20.8±6.0	3.5±1.0	0.8±0.3
F1	2	11.0±1.0	3.5±0.5	1.5±1.5	4	24.2±2.7	5.0±0.9	3.8±1.5	2	6.5±1.5	2.0±1.0	1.0±0.0
F2	1	13	3	3	4	15.8±4.1	1.25±0.6	0.8±0.5	-			
F3	1	24	1	1	4	31.0±6.9	3.0±1.3	1.8±1.0	-			

Table 2. Testing new laboratory culture media with different concentrations of mesquite sap infusion for *Drosophila carbonaria*: Average number of eggs oviposited in 24 hours and total adults emerging.

	0%*	25%	50%	100%
N	4	10	10	10
eggs	24.2±2.7	24.8±2.1	25.5±2.1	24.7±1.3
adults	3.8±1.5	11.9±1.4	11.6±1.5	21.4±1.3

*Values corresponded to F1 individuals in cornmeal on table 1.

Due to the inability of laboratory media to sustain *D. carbonaria* in culture, I sought to determine the relationship between these insects and their native host: mesquite sap fluxes. It was, therefore, necessary to harvest mesquite sap flux from nature. While collecting sap flux directly from mesquite trees would be ideal, plant physiology and the arid desert environment made this impractical. Indeed, only five milliliters of sap were obtained from 36 mesquite rotten processes visited in eight hours of collection. Thus, I collected mesquite bark covered with dry fluxes, which it is very abundant. The bark was removed from the trees with a 30-centimeter long screwdriver. In order to resuspend these dried fluxes, 500 grams of harvested bark was boiled for five minutes in one-liter of double distilled water. Three dilutions, 25%, 50% and 100%, of the resultant liquid were produced. Five milliliters of this sap dilution was then combined with five milliliters hot cornmeal media in a vial and allowed to cool at room temperature for 6 hours.

The three types of resultant media were used to test *D. carbonaria* food preference. Mature mate pairs of F1 *D. carbonaria* raised on cornmeal were introduced to the new sap dilution media. After 12 hours, the flies were removed and eggs counted. Vials were retained to quantify pupal cases and eclosed adults (Table 2). After six days, a piece of boiled mesquite bark was added for perching purposes.

Regardless of the concentration of mesquite sap dilution, no significant differences were observed the quantity of oviposited eggs ($F_{3,30}$ =. 058, p = 0.981). Therefore, the presence of mesquite sap does not affect the female oviposition preference. On the other hand, significant differences between treatments were observed for larval performance on different media. Specifically, larval survival to adulthood is significantly increased by the presence of mesquite sap on the food ($F_{3,30}$ = 18.741, p = 0.000). On average, larval survivorship of *Drosophila carbonaria* in laboratory exhibits a 3-fold increase on 25% and 50% dilutions of mesquite infusion, and a greater than a 5-fold increase on undiluted mesquite sap infusion. A *Drosophila carbonaria* stock maintained in laboratory conditions with 100% dilution is available at the Tucson Stock Center (label 15400-0011.00 at http://stockcenter.arl.arizona.edu).

References: Garner, P.F., W.T. Starmer, M.A. Lachance, and H.J. Phaff 1986, Oecologia 70: 386-392; Jaenike, J., and T.A. Markow 2003, Func. Ecology 17: 115-120; O'Grady, P.M., J.W. Beardsley, and W.D. Perreira 2002, Bishop museum ocasional papers 698: 34-35; Patterson, J.T., 1943, Univ. Texas Publs 4313: 7-216; Patterson, J.T., and M.R. Wheeler 1942, Univ. Texas Publs 4213: 67-109; Sturtevant, A.H., 1942, Univ. Texas Publs 4213: 5-51; Wagner, W.L., D.R. Herbst, and S.H. Sohmer 1990, *Manual of the Flowering Plants of Hawai'i*, University of Hawaii Press & Bishop Museum Press.

Loss of paracentric inversions in laboratory stocks of *Drosophila ananassae*.

Singh, P., and B.N. Singh*. Genetics Laboratory, Department of Zoology, Banaras Hindu University, Varanasi-221005, India. * E-mail: bnsingh@bhu.ac.in

Drosophila ananassae exhibits a high degree of chromosomal polymorphism. It harbors a large number of inversions in its natural populations (Singh, 1998). Out of these reported from various parts of the world, most have restricted distribution while the three cosmopolitan inversions namely, Alpha (AL) in 2L, Delta (DE) in 3L and Eta (ET) in 3R show worldwide distribution (Singh, 1998). Population genetics of chromosomal polymorphism in Indian natural populations of *D. ananassae* has been extensively studied (for references see review by Singh, 1998). The results have clearly shown that there is geographic differentiation of inversion polymorphism.

In the present communication, we report about the fate of two new paracentric inversions namely, theta and iota, (Singh and Singh, 2005a,b) detected from an isofemale line from Bhubneswar (Orissa) and Allahabad (Uttar Pradesh), respectively. *D. ananassae* flies from these places were collected during June 2005 and October 2005, respectively. Two isofemale lines were maintained on the simple culture medium by transferring fifty flies (males and females in equal number). Laboratory stock from Bhubneswar was analysed after 18 generations while laboratory stock from Allahabad was analysed after 14 generations by squashing more than fifty larvae. In both of the stocks the two new inversions namely, theta and iota, were found to be eliminated. Although, a large number of paracentric inversions are known to occur in *D. ananassae*, only three have become coextensive with the species. Most of the inversions have localized distribution and have been detected from the few individuals. This is a feature of the pattern of the chromosomal polymorphism