

Research Notes

Babcock, C. S.¹, D.G. Baldwin¹, W. B. Heed¹, C. A. Istock¹, J. S. Russell¹, and W. J. Etges². ¹Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, Arizona 85721. ²Department of Biological Sciences, University of Arkansas, Fayetteville, AR 72701. Third chromosome inversion polymorphism in Baja California populations of *Drosophila pseudoobscura*.

The genus *Drosophila* was sampled throughout the Baja peninsula on March 19 - 26, 1996. Flies were collected by baiting with fermented bananas in twenty 2.5 quart plastic buckets. Dawn and dusk collections were made with buckets placed approximately 30 feet apart under trees, where available, shrubs, or cacti. Adult *D. pseudoobscura* were obtained from the three northern-most of seven sites baited (Fig. 1). The Observatory Road collection was made at about 6000' along the road to the Sierra San Pedro Martir National Park in a pine and oak forest along a dry creek bed similar to *D. pseudoobscura*'s more northern habitats. The Punta Prieta collection was made in an open desert location in the Viscaïno biotic province, characterized by several species of columnar cacti, agaves, boojums, and other desert vegetation. The small sample from San Ignacio was obtained in an irrigated date palm plantation near a permanent spring.

Chromosomes were analyzed from a single larva of each isofemale line to determine the karyotype. Sample sizes were moderate to small. The Observatory Road sample was found to be highly polymorphic for third chromosome gene arrangements (Table 1). This population shares similar gene arrangement frequencies with other northern Baja California populations, with the exception of TL which has not been observed in Baja until now. Flies from Punta Prieta were polymorphic for two gene arrangements and the sample from San Ignacio, while admittedly small, was also polymorphic.

When considering the frequency data from this and previous studies (Table 1), there appears to be an emerging

geographic pattern of gene arrangements according to latitude in Baja California. The ST and AR inversions are common throughout the peninsula. CH and TL are present at low to moderate frequencies in the Northern Baja populations, but are absent from the Southernmost Baja populations. The SC gene arrangement is present at moderate to high frequencies in the Southernmost populations, but has only been found at low frequencies in the Northern populations. In contrast, the two mainland populations included in Table 1 appear to have different distributions of gene arrangements than the Baja populations.

All males collected in this study were crossed to laboratory stocks to check for the presence of the Sex-Ratio phenotype ($n = 25$). Of these crosses, all yielded nearly equal numbers of male and female offspring, indicating that none of the wild-caught males carried the Sex-Ratio X chromosome. However, two females from Observatory Road and a single female from San Ignacio were determined to be heterokaryotypic for the three inversions associated with the Sex-Ratio X chromosome.

Four additional sites south of San Ignacio were sampled by baiting (Fig. 1, A-D). These sites yielded a total of 153 individuals of 8 species in the genus *Drosophila*, but no *D. pseudoobscura* (Table 2). Thus, it appears

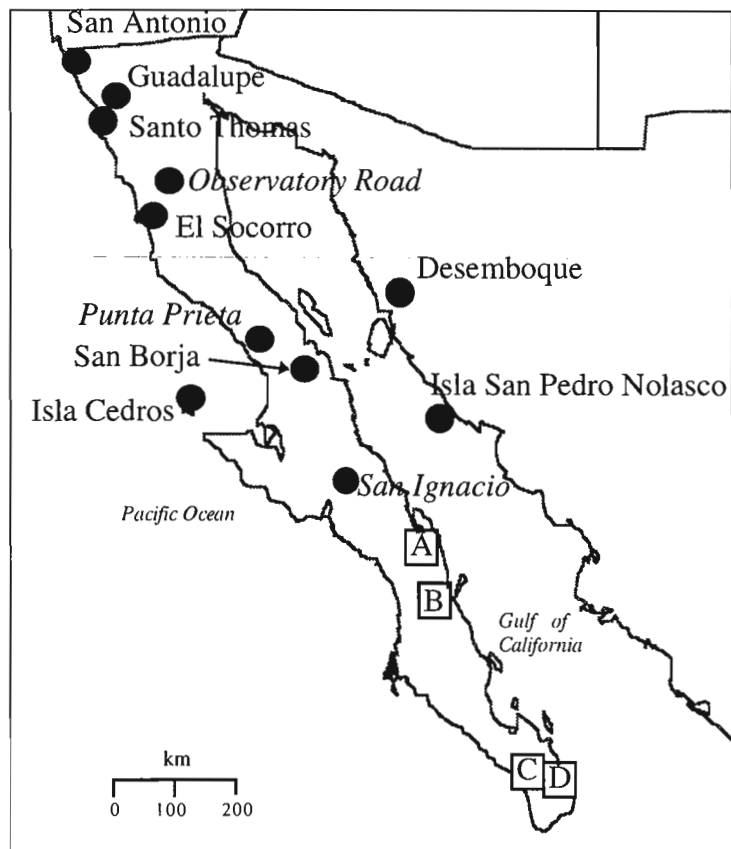


Figure 1. Collecting sites for *D. pseudoobscura* in the Sonoran Desert in and around Baja California. Sites in italics yielded *D. pseudoobscura* in this study, those indicated by a lettered box did not.

from this study that central Baja California may be a boundary for the geographical range of *D. pseudoobscura*. However, one of us (W. B. Heed, unpublished) has records of a few *D. pseudoobscura* individuals collected from the Cape Region in the early spring of 1970, and the winter of 1981. Future collecting in the extensive date palm plantation in Mulegé and the higher elevations of the Sierra de la Giganta north of La Paz and the Sierra de la Laguna in the Cape Region will be required to determine if indeed central Baja has become a species boundary for *D. pseudoobscura*.

Table 1. Site locations and percentage of gene arrangements listed from Northernmost to Southernmost along Baja California and mainland Sonora.

Location	ST	AR	SC	CH	TL	PP	N ¹	Study
San Antonio Mesa	58	24	0	18	0	0	72	Dobz. and Epling, 1944
Santo Tomas and Guadalupe	60	28	9	3	0	0	32	<i>ibid</i>
Observatory Road	75	5	0	10	10	0	20	this study
El Socorro	93	0	7	0	0	0	28 ²	Anderson <i>et al.</i> , 1991
Desemboque (mainland)	50	33	0	17	0	0	24 ²	<i>ibid</i>
Punta Prieta	33	0	67	0	0	0	18	this study
San Borja	67	13	20	0	0	0	64	Anderson <i>et al.</i> , 1991
Isla Cedros	54	31	15	0	0	0	26	Dobz. and Epling, 1944
Isla S. Pedro Nolasco (main)	8	63	25	4	0	0	24 ²	Jefferson <i>et al.</i> , 1974
San Ignacio	25	0	75	0	0	0	4	this study

¹Number of chromosomes.

²Fewer individuals were collected, but several were testcrossed to infer the chromosomes of *both* parents of captured adult.

Table 2. Number of individuals captured by baiting according to species¹ and site sampled.

Site	pse	mel	sim	bus	hyd	moj	nig	mai	ald	ari	spe	ham
Observatory Road	15	0	0	3	1	0	0	0	0	0	0	3
Punta Prieta	19	0	0	0	0	65	5	0	0	0	0	0
San Ignacio	12	0	11	0	0	0	0	0	0	0	0	0
A. Bahia Concepcion	0	0	0	0	0	15	0	0	0	0	0	0
B. Punta Agua Verde	0	0	0	0	0	11	4	6	2	0	0	0
C. Todos Santos	0	6	20	0	0	31	0	0	0	0	0	0
D. Santiago	0	2	4	0	0	43	0	4	3	1	1	0

¹Species abbreviations are as follows: pse, *D. pseudoobscura*; mel, *D. melanogaster*; sim, *D. simulans*; bus, *D. busckii*; hyd, *D. hydei*; moj, *D. mojavensis*; nig, *D. nigrospiracula*; mai, *D. mainlandi*; ald, *D. aldrichi*; ari, *D. arizonae*; spe, *D. spenceri* and ham, *D. hamatofila*.

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References: Anderson W. W. *et al.*, 1991, PNAS 88: 10367-10371; Dobzhansky, Th. and C. Epling 1944. *Carnegie Inst. Washington Publ.* 554; Jefferson, M. C. *et al.*, 1974, Dros. Inf. Serv. 51:65.

Shivanna, N., and S.R. Ramesh. Department of Studies in Zoology, University of Mysore, Manasagangotri, Mysore 570 006, India. Intraspecific larval pupation site preference in *Drosophila melanogaster*.

mettleri, *D. ananassae*, *D. bipectinata*, and *D. malerkotliana* (Sokal, 1966; Sameoto and Miller, 1968; DeSouza, *et al.*, 1968; Markow, 1979; Fogleman and Markow, 1982; Sokolowski, 1985; Singh and Pandey, 1991; Pandey and Singh, 1993) have been made. In most of these studies, the influence of various factors on PSP has been investigated by measuring the pupation height (the distance a larva pupates above the surface of the food medium). The PSP has also

The larval pupation site preference (PSP) is an important event in *Drosophila* preadult development; because the place selected by the larvae can have decisive influence on their subsequent survival as pupae (Sameoto and Miller, 1968). Investigations on PSP in various species such as *D. melanogaster*, *D. simulans*, *D. willistoni*, *D. pseudoobscura*, *D. nigrospiracula*, *D.*