Research Notes

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A note on the feeding ecology of adult *Drosophila nigrospiracula*, a Sonoran Desert-endemic fruit fly.

The general picture of the breeding ecology of the four species of Sonoran Desert -endemic *Drosophila* is that they all possess a high degree of host plant specificity, controlled in part by host plant toxicity and competitive exclusion processes (Fellows and Heed, 1972; Heed and Mangan, 1986). One of these species, *Drosophila nigrospiracula* Patterson and Wheeler, which belongs to the *repleta* species group, occurs in southern Arizona, northwestern Mexico, and Baja California. It mainly breeds in necroses of saguaro (*Carnegiea gigantea*) and cardón (*Pachycereus pringlei*), but occasionally also in those of hecho (*Pachycereus pecten-aboriginum*) and barrel (*Ferocactus wislizenii*) cacti (Heed, 1978). The diet of both larval and adult *D. nigrospiracula* consists of components of the necrotic cactus tissue and microorganisms, such as a variety of yeast species, that colonize these substrates (Heed *et al.*, 1978; Starmer *et al.*, 1982). Adult *D. nigrospiracula* are commonly seen on the exterior surface of necrotic cacti consuming liquid exuding from the decaying tissue. In numerous samples of flies collected at saguaro cacti in the vicinity of Phoenix, Arizona, U.S.A., we have observed *D. nigrospiracula* and *D. mettleri* of both sexes carrying pollinia of a milkweed vine, *Matelea parvifolia* (Torrey) (Asclepiadeacea), attached to their mouthparts and associated structures. Flies therefore visit flowers of this vine probably to feed, implying that the feeding ecology of adult flies is not as restricted to their host plant as commonly believed.

Table 1. Proportion of flies of both sexes carrying pollinia and mean number pollinia per fly across 5 collection dates.

Date	Sex	Proportion flies carrying pollinia (N)	Mean number pollinia/fly ± SE(N)
Dec. 10, 1994	M	0.027 (74)	1.0 ± 0 (2)
	F	0.020 (98)	1.0 ± 0 (3)
Jan. 14, 1995	M	0.33 (135)	1.64 ± 0.16 (44)
	F	0.39 (43)	1.41 ± 0.15 (17)
Jan. 22, 1995	M	0.30 (89)	1.33 ± 0.11 (27)
	F	0.31 (26)	1.75 ± 0.16 (8)
Jan. 31, 1995	M	0.21 (112)	1.41 ± 0.15 (24)
	F	0.41 (29)	1.50 ± 0.34 (12)
Feb. 11, 1995	M	0.17 (76)	1.23 ± 0.12 (13)
	F	0.042 (24)	1.0 ± 0 (1)
Pooled	M	0.226 (486)	1.42 ± 0.071 (110)
	F	0.182 (120)	1.46 ± 0.12 (41)

In our sampling procedure, flies were netted at necrotic saguaro cacti located within 45 miles E. of Phoenix, aspirated into vials containing banana-agar medium, and returned to the laboratory on the same day of collection where flies were sexed, and number of pollinia on each fly counted. Results of a survey of adult *D. nigrospiracula* based on collections made during 1994-1996 across five different dates are presented in Table 1. Pollinia occurred on flies as early as the beginning of December, increased to a maximum frequency by mid - late January, and decreased thereafter. Sexes did not differ in frequency at which they carried pollinia (Table 1, χ^2 on pooled data = 2.26, 1 d.f., $P > 0.1$), nor did they differ in mean number of pollinia per fly (Table 1, t test on pooled data, $t = 0.12$, 149 d.f., $P = 0.90$). Among flies that carried pollinia, number of individual pollinia per fly ranged from 1 to 5, and mean number ranged from 1.0 to 1.75. On individual flies harboring multiple pollinia, pollinia either had one or both translator arms missing, whereas other pollinia on the same fly appeared fresher (less desiccated) and had both translator arms attached to the corpusculum. This variation in pollinia structure and age suggests that flies make multiple visits to feed from vines over their lifetimes. For comparison with our samples of *Drosophila*, males of two tachinid species, *Chaetonodexodes vanderwulpi* (N = 58) and *Opsoneigenia nana* (N = 19), were collected in Jan 1995 from a hilltop within 200 m of a saguaro cactus at which we took samples of adult *Drosophila*. Individual tachinid flies were pinned on the same day of collection and scored for the presence of *M. parvifolia* pollinia. Neither species was found to carry pollinia.

Our findings suggest that *D. nigrospiracula* feeds on the nectar of asclepiad flowers, perhaps to acquire free sugars which may not occur at sufficient concentrations at cactus necroses. An experimental study of *D. mojavensis* , which breeds primarily in the necroses of *Stenocereus gummosus* (agria) and *Stenocereus thurberi* (organpipe), showed that free sugars are important for adult survival, and that adult flies cannot obtain sufficient amounts of sugars from these cacti (Brazner *et al.*, 1984). Another possible source of free sugars is the ripe, open fruits of *Opuntia* and other cacti. For example, we have often observed the crops of *D. nigrospiracula* during the fruiting period of *Opuntia* to be filled with the wine-colored juice characteristic of its fruit. Extrafloral nectaries (*e.g.*, Blom and Clark, 1980), which exist on columnar and *Opuntia* cacti, might represent another source of sugars utilized by *D. nigrospiracula.*

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Zak, N.B. Experimental Medicine and Cancer Research, Hebrew University-Hadassah Medical School, Jerusalem, Israel. A note on *tailup*.

Tailup (*tup*) is one of six loci whose zygotic expression is required for germband retraction of the *Drosophila melanogaster* embryo. The *tup* locus has not been cloned. Two ethyl methanesulfonate-induced *tup* alleles have been isolated and the locus was determined to be in map position 54.0. It was cytologically placed between 37A1-B1 and 37B2-8 because it is removed by *Df(2L)137 = Df(2L)36C2-4;37B9-C1* but not by *Df(2L)H68 = Df(2L)36B-C1;37A1-B1* or *Df(2L)TW158 = Df(2L)37B2-8;37E2-F4* (Nüsslein-Volhard *et al.*, 1984). Not surprisingly, we have observed that *tup* is removed by *Df(2L)TW3 = Df(2L)36F7-37A1;37B2-8*. We have tested three lethal loci, each representing one lethal complementation group that is uncovered by this deficiency, for allelism to *tup*. One of them, the ethyl methanesulfonate-induced mutation *l(2)37Aa*, is an additional *tup* allele. *l(2)37Aa* is also known as *l(2)E41*, which was placed in the genetic location 53.1-53.9 (Wright *et al.*, 1976). *l(2)02660r*, a P element insertion allele generated by Paul Lasko at McGill University, falls within the *TW3* interval but is not allelic to *tup*. *l(2)02660r* could serve as a good starting point for "local hopping" into the *tup* locus.

References: Nüsslein-Volhard, C., E. Wieschaus, and H. Kludig 1984, Roux's Archiv. Dev. Biol. 193:267-282; Wright, T.R.F., G.C. Bewley, and A.F. Sherald 1976, Genetics 84:287-310.

Hodge, Simon[1,3] **and Paul Mitchell**[2] 1. Dept. of Entomology and Animal Ecology, PO Box 84, Lincoln University, Canterbury, New Zealand; 2. Biology Division, Staffordshire University, College Road, Stoke-on-Trent, ST4 2DE, UK; 3. Author to whom correspondence should be addressed. The concentration of urea in the larval resource and its effect on larval performance.

Introduction: The excretion of metabolic wastes and secretion of enzymes for external digestion by dipteran larvae can alter the biochemical nature of their environment. This habitat modification can have both negative and positive effects on the success of other larvae which simultaneously or subsequently use the resource (Weisbrot, 1966; Dawood and Strickberger, 1969; Budnik and Brncic, 1975; Mitchell, 1988).

Urea has been identified as an excretory product of *Drosophila*, and at high concentrations has been shown to slow down the developmental rate of *Drosophila melanogaster* and reduce larval survival (Botella *et al.*, 1985).

This paper describes the amounts of urea produced by *Drosophila* larvae and re-examines the effects of urea on larval performance.

Methods: All experiments used wild-type stocks of *Drosophila*: 'Kaduna' for *D. melanogaster* and stocks reared from British flies for *D. hydei*. A temperature of 25°C, relative humidity of approximately 45% and a 16:8 hours light:dark regime was used in all cases. The experiments were carried out using standard glass vials (75mm x 25mm diameter) stoppered with foam bungs.

Vials of resource medium were prepared by hydrating 1.0g of ground Instant *Drosophila* Medium (IDM; Blades Biological Ltd., UK) with 4.0ml of distilled water. The vials of IDM were then seeded with three densities of first instar larvae: 0, 25 and 50. At least six replicates of each density were initially set up for both *D. melanogaster* and *D. hydei* (actual replicate numbers for each treatment for each particular assay are given in the Results section). The vials were left until the majority of the larvae had pupated and no larvae were visible in the resource; more specifically 8 days for *D. melanogaster* and 12 days for *D. hydei*. The remaining medium was then freeze-dried and stored at 4°C.

The above procedure was also carried out using 5.0g of mashed banana instead of IDM to examine urea concentrations produced when larvae were reared on a natural resource. The development of the larvae was slightly