

Suma, J.R., K. Ravi Ram, and S.R. Ramesh. 2001. Copulation duration in the orbital sheen complex members of *Drosophila nasuta* subgroup. *Dros. Inf. Serv.* 84: 59-61.



Copulation duration in the orbital sheen complex members of *Drosophila nasuta* subgroup.

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Mating behavior in *Drosophila* includes a series of courtship elements, and copulation duration is one among them. The duration of copulation is found to vary from a minimum of 5 seconds (Grossfield and Rockwell, 1979) to a maximum of 62 minutes (Spieth, 1952); and hence it is considered to be species specific even though individual variations are found. However, copulation duration of less than 10 min is a characteristic feature of several species, and closely related species have similar mean durations of copulation (Sturtevant, 1942; Wheeler, 1947; Patterson, 1947). *Drosophila nasuta* subgroup is one such congregation of closely related species/subspecies which are morphologically almost identical and show different degrees of cross fertility (Wilson *et al.*, 1969). Based on the silvery markings on the head region of the males, they are grouped into frontal, orbital, and no sheen complexes (Nirmala and Krishnamurthy, 1974). Using four members of the *nasuta* subgroup, Spieth (1952) demonstrated that they copulate for a relatively long period. However, nothing about copulation duration is known in *D. s. albostrigata* and *D. s. neonasuta*, which belong to the orbital sheen complex. Hence, in the present study an attempt has been made to record the duration of copulation in the members of the orbital sheen complex.

For the present study, stocks of *D. sulfurigaster sulfurigaster* (Queensland, Australia; Stock No. 205.001), *D. s. albostrigata* (Cambodia; Stock No. 207.001) and *D. s. neonasuta* (Mysore, India; Stock No. 206.001) were obtained from Drosophila Stock Center, University of Mysore, Mysore, India. 50

Table 1. Copulation duration in different intra- and inter-specific crosses.

Sl. No.	Crosses	Duration of copulation (min)
1	<i>D. s. sulfurigaster</i> ♀♀ X <i>D. s. sulfurigaster</i> ♂♂	17.80 ± 0.15 ^a
2	<i>D. s. albostrigata</i> ♀♀ X <i>D. s. albostrigata</i> ♂♂	9.60 ± 0.35 ^b
3	<i>D. s. neonasuta</i> ♀♀ X <i>D. s. neonasuta</i> ♂♂	16.40 ± 0.24 ^a
4	<i>D. s. sulfurigaster</i> ♀♀ X <i>D. s. albostrigata</i> ♂♂	13.8 ± 0.74 ^c
5	<i>D. s. sulfurigaster</i> ♂♂ X <i>D. s. albostrigata</i> ♀♀	16.6 ± 0.35 ^a
6	<i>D. s. albostrigata</i> ♀♀ X <i>D. s. neonasuta</i> ♂♂	15.4 ± 0.09 ^{ac}
7	<i>D. s. albostrigata</i> ♂♂ X <i>D. s. neonasuta</i> ♀♀	13.0 ± 0.51 ^c
8	<i>D. s. neonasuta</i> ♀♀ X <i>D. s. sulfurigaster</i> ♂♂	20.4 ± 0.09 ^{ac}
9	<i>D. s. neonasuta</i> ♂♂ X <i>D. s. sulfurigaster</i> ♀♀	15.6 ± 0.16 ^d
	F value	2017.9

df = (8, 216)

Note: The values with similar letter in superscript are not statistically significant at 5% level according to DMRT.

synchronized eggs collected from the stock cultures by following the modified method of Delcour (Ramachandra and Ranganath, 1988) were placed in each vial (8 × 2.5 cms) containing wheat cream agar medium seeded with yeast. Care was taken to maintain

constancy of temperature (22 ± 1°C), moisture (69% RH), and quantity of food (5 ml/vial) in these cultures which otherwise would influence the larval development and ultimately the size of the adults.

Virgin females and unmated males from each culture were collected within 3 hr of their eclosion from the pupal case and aged for 7 days in vials containing fresh medium seeded with yeast. These flies were maintained at $22 \pm 1^\circ\text{C}$ under normal laboratory light conditions (12:12). With the help of an aspirator, a male and a female were introduced into a fresh culture vial and the duration of copulation that included the period from “mounting” of the male to “parting” was recorded in both intra- and inter-crosses involving these subspecies. Twenty five replicates were observed in each case, and the mean copulation duration was determined. All the pair matings were conducted during morning hours (7-11 am) when the ambient temperature ranged between $22\text{-}24^\circ\text{C}$. The data were subjected to ANOVA followed by DMRT to determine the level of significance.

Perusal of Table 1 that embodies data on copulation duration in different members and crosses involving these members reveals that the duration of copulation varied from a minimum of 9.6 min to a maximum of 17.8 min in the intraspecific crosses, while in the interspecific crosses the duration varied from 13 min (*D. s. neonasuta* females \times *D. s. albostrigata* males) to 20.4 min (*D. s. neonasuta* females \times *D. s. sulfurigaster* males). The copulation duration in the case of *D. s. albostrigata* was found to be significantly different from the other two. The difference in copulation duration in the reciprocal crosses involving *D. s. sulfurigaster* was found to be significant. Working with six members of the *D. nasuta* subgroup, Spieth (1969) showed that interspecific differences with regard to copulation duration are of the same general magnitude as the intraspecific variations. However, in the present study, copulation durations in only three crosses were found to be non-significant with *D. s. sulfurigaster* and *D. s. neonasuta* (Sl. Nos. 5, 6, & 8; Table 1). Even in the reciprocal crosses, the copulation duration was found to be non-significant only in crosses between *D. s. albostrigata* and *D. s. neonasuta*.

Spiess (1968) recorded mating latency and time of copulation in different karyotypes of *D. pseudoobscura*, and the results clearly indicated that the duration of copulation was the uniform part of male mating activity. The duration of copulation is male-determined in various species of *Drosophila* and is an expression of rate of sperm transfer (Kaul and Parsons, 1965; MacBean and Parsons, 1967; Spiess, 1970). However, in the present study, it was observed that duration of copulation was minimum wherever the males or females of *D. s. albostrigata* were used. Further, *D. s. sulfurigaster* males, when allowed to copulate with *D. s. neonasuta* females, have a duration of 20.4 minutes, while with *D. s. albostrigata* females, it copulated only for 16.6 minutes, the difference being statistically significant. This clearly shows that the duration of copulation is not an exclusive part of male mating activity. Instead, it is determined by both males and females involved in the cross. This supports the findings of Krebs (1991) who has reported that, in *D. mojavensis*, the variation in copulation duration is influenced by genes in both sexes and also by the size of both sexes.

Acknowledgments: The authors thank the Chairman, Department of Studies in Zoology, for the facilities and Prof. H.A. Ranganath for suggestions.

References: Grossfield, J., and R.F. Rockwell 1979, *Am. Midl. Natur.* 101: 257-268; Nirmala, S.S., and N.B. Krishnamurthy 1974, *J. Mysore Univ.*, 26: 162-167; Patterson, J.T., 1947, *Univ. Texas Publ.* 4720: 41-77; Ramachandra, N.B., and H.A. Ranganath 1988, *Genome* 30: 58-62; Spieth, H.T., 1952, *Bull. Am. Mus. Natur. Hist.* 99: 395-474; Spieth, H.T., 1969, *Univ. Texas Publ.* 6918: 255-270; Sturtevant, A.H., 1942, *Univ. Texas Publ.* 4213: 5-66; Wheeler, M.R., 1947, *Univ. Texas Publ.* 4720: 78-115; Wilson, F.D., M.R. Wheeler, M. Harget, and M. Kambysellis 1969, *Univ. Texas Publ.* 6918: 207-253.